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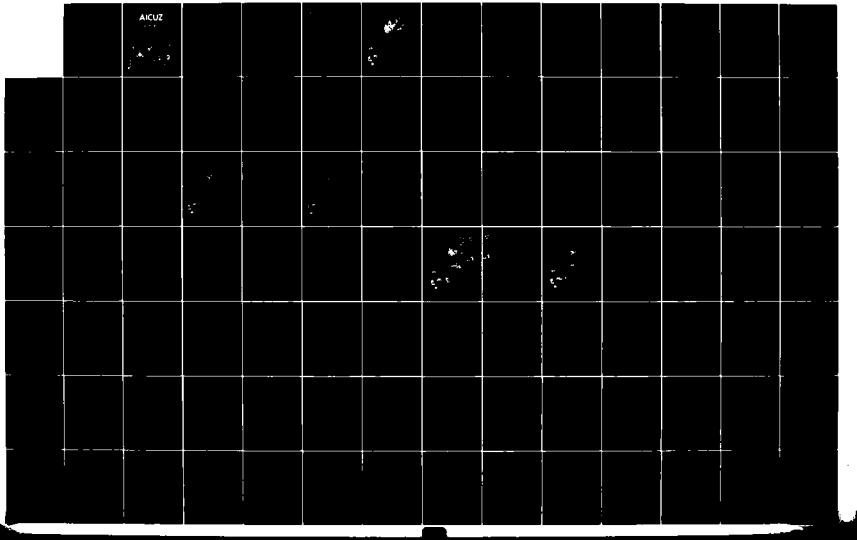

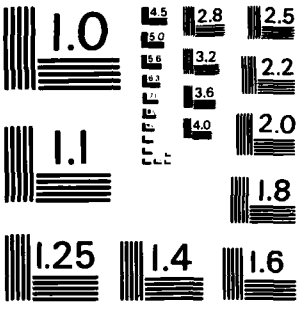

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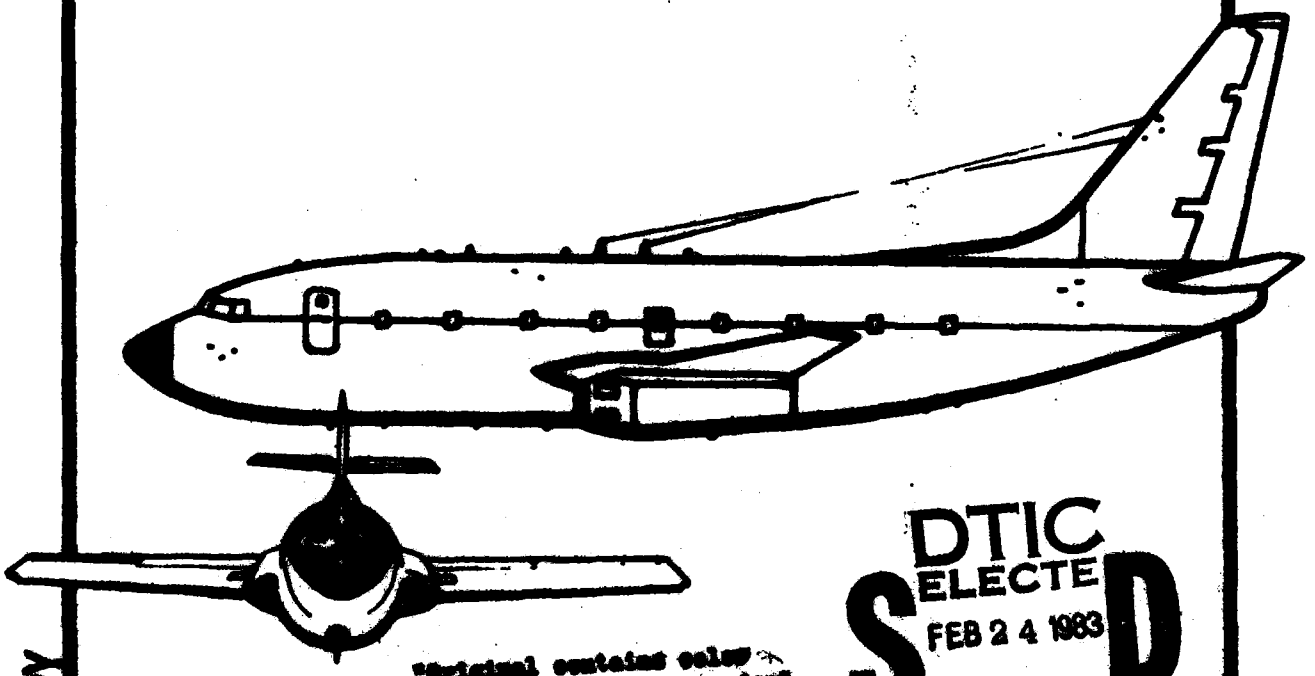

MATHER AIR FORCE BASE, CALIFORNIA

AMENDED SEPTEMBER 1982

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

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Accident Potential Study
Noise Level Reduction Guidelines

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*
The AICUZ uses the latest technology to assess noise levels and a statistical analysis to determine aircraft accident potential zones. Airfield environs planning is concerned with three primary determinants: (1) Accident potential to land users; (2) Aircraft noise; and (3) Hazards to operations from land use. Land use decision should carefully consider the health and welfare of the public, flying safety, the contribution of the flying mission to national defense, and the overall economic and social interrelationships of Mather AFB and the local communities.

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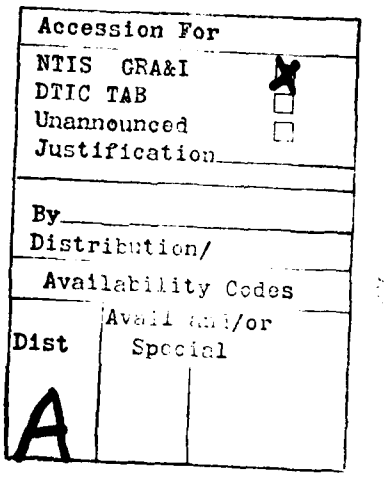
SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

AIR INSTALLATION COMPATIBLE USE ZONE (AICUZ) MATHER AIR FORCE BASE, CALIFORNIA

SUBMITTED TO THE GOVERNMENTS AND CITIZENS OF THE MATHER AFB ENVIRONS



SEPTEMBER 1982

Supercedes Mather AFB AICUZ Report, September 1975, as Amended January 1978.

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 323D FLYING TRAINING WING (ATC)
MATHER AIR FORCE BASE, CA 95655

REPLY TO ATTN OF CC

29 JUL 1982

SUBJECT Air Installation Compatible Use Zone (AICUZ)

TO THE GOVERNMENT AND CITIZENS OF THE MATHER AIR FORCE BASE ENVIRONS

1. The attached September 1982 AICUZ Report for Mather AFB supersedes our previous report dated January 1978. This report examines and evaluates noise and accident potential for current aircraft operations, and presents recommended land use planning mechanisms designed to protect both the citizens of the surrounding communities and the operational capability of Mather AFB.

2. Since 1978, there has been a significant increase in flight operations and a corresponding enlargement of the AICUZ environs. This increased activity was generated by the demand for more qualified navigators by the Department of Defense and friendly foreign countries, for whom Mather AFB conducts all formal navigator, navigator-bombardier, and electronic warfare officer training. Concurrently, surrounding communities have responded to their substantial growth needs to some extent by encroachment of the Mather AFB AICUZ environs.

3. We encourage careful reexamination of existing and future land uses within and adjacent to the Mather AFB AICUZ environs for the purpose of restraining the trend of incompatible development. In conditionally compatible areas, local building and noise ordinances should be modified to specifically address AICUZ recommendations.

4. The tremendous economic impact of Mather AFB on the Sacramento area constitutes an investment well worth protecting for the future. Through the cooperative efforts of the Air Force and the surrounding communities, we will achieve mutually beneficial environmental, economic, and national security goals.

Richard D. Paul

RICHARD D. PAUL, Colonel, USAF
Commander

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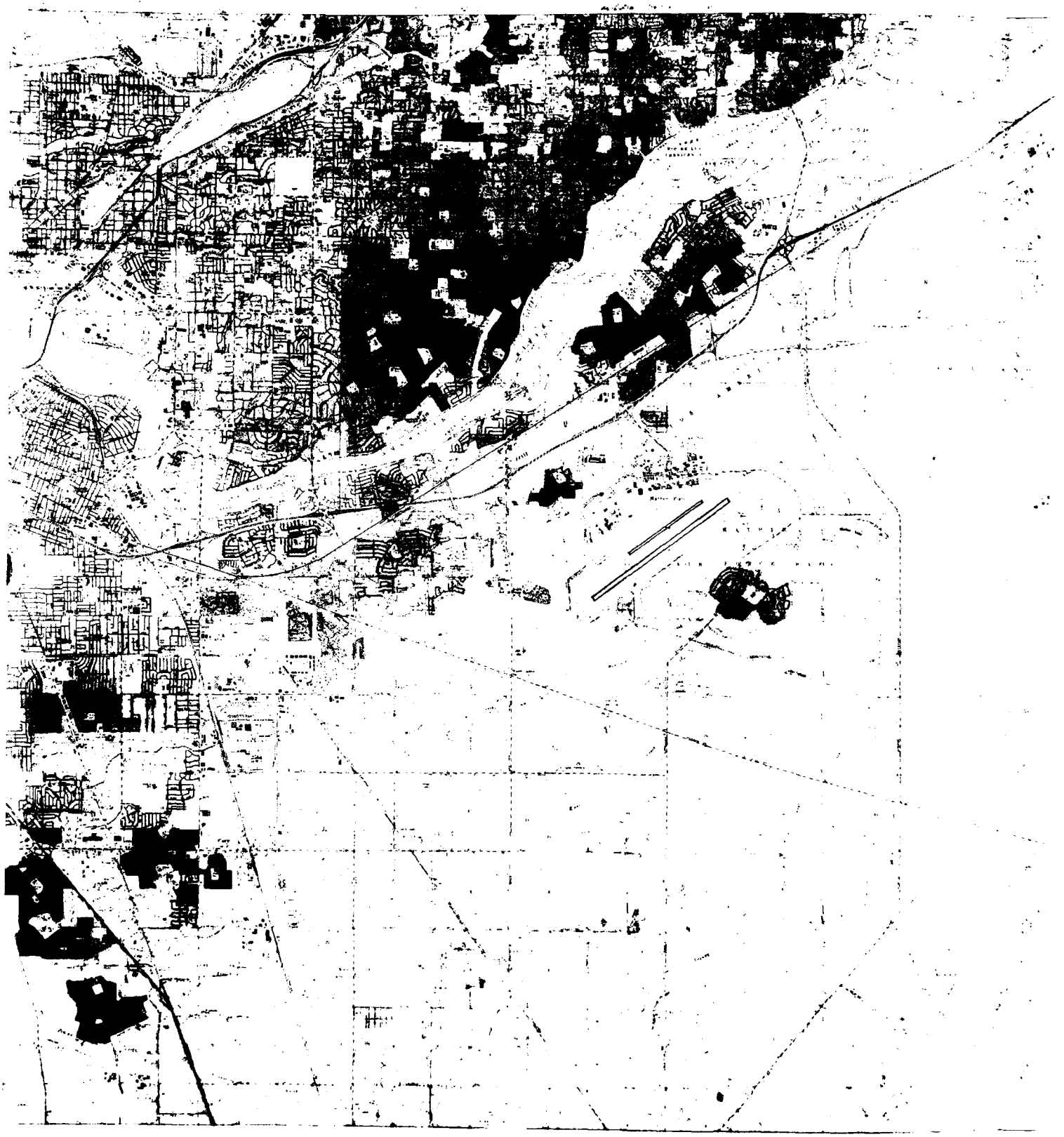
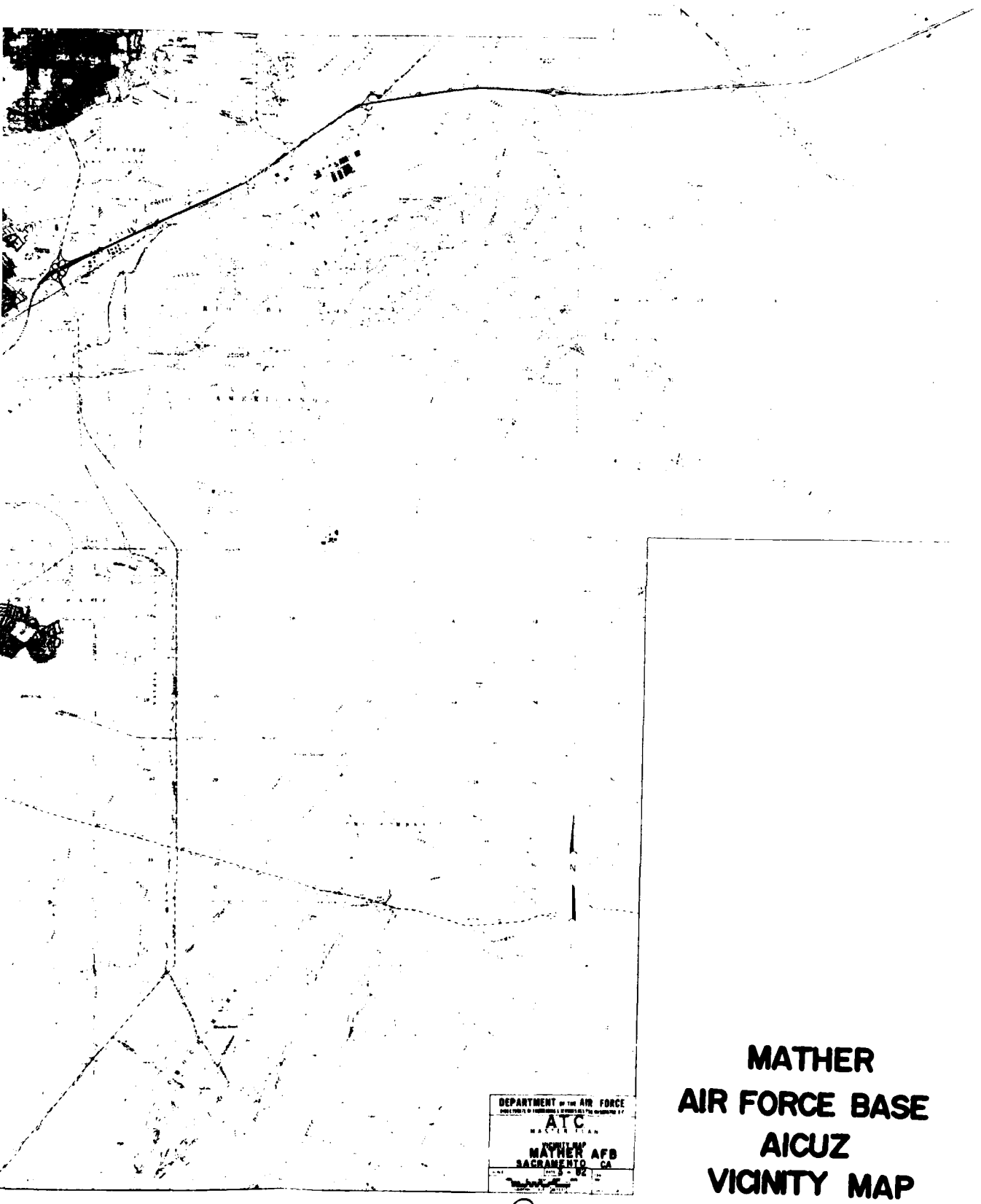
AICUZ Report





MATHER AIR FORCE BASE AICUZ VICINITY MAP

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SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

The development and use of lands near U.S. Air Force bases is of continuing concern to Air Force officials. It is recognized that the public must be protected from noise and other hazards of air base operations. At the same time it is recognized that lands near air bases often are highly attractive areas for development.

To provide both protection of the public and compatible development of lands adjacent to airfields, land-use controls are necessary. Where such controls are absent, incompatible development may proceed with serious negative impacts for both the community and the Air Force.

Recognizing a responsibility to assist local communities in dealing with Air Force operations, the Air Force has developed an Air Installation Compatible Use Zone (AICUZ) concept. The AICUZ provides data for local communities to use in managing land use near air bases. The AICUZ concept is designed to: (1) Protect adjacent communities from the noise and safety hazards associated with aircraft operations, and (2) to preserve the operational integrity of airfields. AICUZ specifies a wide variety of types and intensities of land use by a series of Compatible Use Districts (CUDs) developed from a detailed study of aircraft operations at Mather AFB.

Combining the AICUZ with existing zoning and proposed future land use in the AICUZ environs depicts the current degree of land use compatibilities and incompatibilities, and introduces essential information necessary to guide future land use decisions by the local governments. Section IV of this report provides this important study of existing and proposed future conditions in the AICUZ.

The role of the Air Force is to advise, recommend, and take official positions on land use matters in the AICUZ environs to avoid future conflict and confusion. The Air Force will continue to evaluate its operations to minimize environmental effects in the surrounding community.

CONCLUSIONS

Aircraft operations are likely to continue from Mather AFB for the indefinite future. Operations will include the T-37, T-43, B-52, KC-135 or replacement aircraft. The types of aircraft, flight tracks, frequency, and other characteristics will be continuously evaluated by Mather AFB to determine the effects on the AICUZ and the community.

An analysis of existing zoning and proposed future land use within the Mather AFB AICUZ reveals the existance of considerable incompatible and conditionally compatible areas based on AICUZ land use compatibility guidelines. A primary concern to Mather AFB is the incompatible area of agricultural/low density residential zoning and proposed future land use commencing approximately four miles southwest of the main runway in CUDs 6 and 7. The two smaller incompatible areas of low density residential

and public zoning just west of the base also are of concern to Mather AFB. Designating a large area in the southwest part of the AICUZ (CUDs 6, 7, 12, and 13) as Agricultural-Urban Reserve is not consistent with AICUZ guidelines, assuming continued aircraft operations at Mather AFB for the indefinite future.

Encroachment of Mather AFB has not yet reached a critical stage because of the past predominance of agricultural and industrial land uses in the vicinity of the base, and because of positive actions taken by local government in protecting airfield environs. County and community General Plans support AICUZ policy and local planners and decision-makers consistently strive to avoid and eliminate airfield encroachment to the maximum extent possible.

RECOMMENDATIONS

The AICUZ study was prepared to promote orderly and compatible land use around Mather AFB. Land use guidelines and noise measurement techniques are based on recent technology. Data from this study should be considered for incorporation into existing land use plans and ordinances of surrounding communities, and used as a basis for decisions on future land development requests.

Local authorities should review their building codes and, where necessary, consider incorporation of noise attenuation requirements for new construction within the Mather AFB AICUZ. Appropriate noise attenuation features in new construction would help to offset marginally excessive noise levels, thus permitting greater use of land in certain areas.

Of the possible land use conflicts with aircraft operations, residential incompatibilities are the most predominant. Although it is possible to establish general guidelines, land use proposals should be fully evaluated on a case-by-case basis. In this light, residential uses are totally incompatible in CUDs 6 and 7, strongly discouraged in CUD 12, and discouraged in CUD 13. Residential uses should only be permitted in CUD 13 following a full evaluation and should require Noise Level Reduction Standards to be incorporated into building design criteria. It should also be ensured that proposed structures within the AICUZ do not violate height and obstruction criteria necessary for safe aircraft operations.

Land designated as Agricultural-Urban Reserve in CUDs 6, 7, 12, and 13 should be redesignated to a use which would ensure compatibility, either Permanent Agriculture or Agricultural-Industrial Reserve.

There is a wide range of compatible land uses within the AICUZ. Every reasonable effort should be made to plan for and promote compatible uses in lieu of permitting uses which are incompatible. The final determination of land use is the responsibility of local government, and decisions should fully consider both the needs of the community and the protection of the airfield environs. Health and welfare of the public, and safe aircraft operations should be of paramount importance in the decision-making process. Short term economic gain should be carefully weighed against possible long term economic loss.

I. INTRODUCTION

THE CHALLENGE

Ai fields, military and civilian, attract activity in their environs. Sizable new cites may grow up near the airfield, or existing cites may grow outward toward the airfield environs. The inevitable encroachment process then makes inroads on the potential freedom of airfields to support flight operations. In some cases, sufficient adverse reactions against operations have arisen to contribute to the eventual elimination of flying. There appears to be two basic ways to handle this trend, either by converting the encroachment into a compatible development process or by constructing new airfields. Recognizing the likely limits to future construction budgets, and assuming that the military flying force structure may be reduced, it seems very unlikely that the Air Force will build many (if any) new military airfields within the United States. In reality, the Air Force will have to continue to use its existing military airfields and therefore must ask the community to prevent incompatible development caused by urbanization.

Land use controls for areas adjacent to airfields are necessary. Serious negative impacts can result where such controls are absent and incompatible development proceeds.

Aside from the accident potential, aircraft generate a considerable amount of noise. Several Air Force installations have ceased flying operations or closed entirely due in part to adverse action by those who unwittingly purchased homes too close to these bases. Similarly, Los Angeles International Airport, which has been thoroughly encroached upon over the years, has had several billion dollars in lawsuits pending in the courts.

Though originally sited some distance from its support communities, Mather AFB is beginning to feel the effects of land development. Experience has shown that when unguided development impinges upon an airfield's accident potential areas and/or high noise zones, the impacted groups soon seek relief. This can range from the imposition of "quiet hours" to the complete closure of a facility. Conversely, it must be recognized that the public must be protected from the noise and danger inherent in airbase operations. Therefore, it is in the best public interest to protect the taxpayer's multi-million dollar investment in Mather AFB, and also to give the citizens a plan for the rational development of lands impacted by aircraft operations that is fully attentive to their health, safety, and welfare.

The Air Force mainly flies four models of aircraft, the B-52, KC-135, T-37B, and T-43A at Mather AFB. These planes are typically noisy and not immune from accidents. However, the mission of Mather AFB is vital to our national defense both as the only navigator training base in the Department of Defense and as host to an important Strategic Air Command mission.

The Air Force has developed the Air Installation Compatible Use Zone (AICUZ) concept in recognition of the critical nature of urban encroachment. The purpose of AICUZ is to protect Air Force installation operational

capabilities from the effects of incompatible land use and to assist local, regional, state, and federal officials in protecting and promoting the public health, safety, and welfare by providing information on aircraft accident hazards and noise.

The AICUZ proposal for Mather AFB is based on a methodology developed by the Air Force which analyzes accident potential and noise exposure. Land use districts and guidelines have been developed. The guidelines are a composite of a number of other airport land use compatibility studies which have been refined to fit the Mather AFB aviation environment.

The AICUZ land use guidelines ensure compatibility with airfield operations and allow maximum beneficial use of contiguous property.

AICUZ LAND USE DEVELOPMENT POLICIES

The basis of any effective land use control system is a set of land development policies which serve as the standard by which all airfield environs land use planning and control actions are evaluated. The Air Force recommends that the following policies be considered for incorporation into the comprehensive plans for the Mather AFB environs:

POLICY #1: In order to promote the public health, safety, peace, comfort, convenience, and general welfare of the inhabitants of airfield environs, it is necessary to:

1. Guide, control, and regulate future growth and development.

2. Promote orderly and appropriate use of land.

3. Protect the character and stability of existing land uses.

4. Prevent the impairment of the airfield and public investment therein.

5. Enhance the qualityof living in the areas affected.

6. Protect the general economic welfare by restricting imcompatible land use.

POLICY #2: In order to implement Policy #1, it is necessary to:

1. Incorporate and modify the Air Installation Compatible Use Zone concept into existing land use plans to:

   a. Establish guidelines of land use compatibility.

   b. Restrict or prohibit incompatible land use.

   c. Prevent land use which would endanger aircraft operations and the continued use of the airfield.

2. Adopt appropriate ordinances to implement airfield environs land use plans.

POLICY #3: The following incompatible land uses must be restricted or prohibited.

1. Uses which release into the air any substance such as, but not limited to, steam, dust, and smoke, which would impair visibility or otherwise interfere with the operation of the aircraft.

2. Uses which produce light emissions, either direct or indirect (reflective), which would interfere with pilot vision.

3. Uses which produce electrical emissions which would interfere with aircraft communication systems or navigational equipment.

4. Uses which attract birds or waterfowl, such as operation of sanitary landfills, maintenance of feeding stations, or growth of certain vegetation.

5. Uses which provide for structures within 10 feet of aircraft approach-departure and/or transitional surfaces.

POLICY #4: Certain noise levels of varying duration and frequency create hazards to both physical and mental health. Also, a limited though definite danger to life exists in certain areas adjacent to airfields. Where these conditions exist, it is not consistent with the public health, safety, and welfare to allow the following land uses:

1. Residential.

2. Retail business.

3. Office buildings.

4. Public buildings (schools, churches, etc.)

5. Recreation buildings and structures.

POLICY #5: Land areas below takeoff and final approach flight paths are exposed to significant danger of aircraft accidents. It is, therefore, necessary to limit the density of development and intensity of use in such areas.

POLICY #6: Different land uses have different sensitivities to noise. Standards of land use should be adopted, based on these noise sensitivities. In addition, a system of Noise Level Reduction guidelines for new construction should be implemented to permit certain uses where they would otherwise be prohibited.

POLICY #7: Land use planning and zoning in the airfield environs cannot be based solely on aircraft-generated effects. Allocation of land used within the AICUZ should be further refined by analysis of:

1. Physiographic factors.

2. Climate and hydrology.

3. Vegetation.

4. Surface geology.

5. Soil characteristics.

6. Intrinsic land use suitabilities and constraints.

7. Existing land use.

8. Land ownership patterns and values.

9. Economic and social demands.

10. Cost and availability of public utilities, transportation, and community facilities.

11. Other noise sources.

STUDY OBJECTIVES AND CONTENT

This Mather AFB AICUZ study is presented as a statement of the Air Force's perspective on aircraft noise and accident potential in the environs of Mather AFB. It is intended to serve as an input to the local comprehensive land use planning process of the jurisdictions which surround the base.

The objectives of this study are to examine the effects of aircraft noise and accident potential from flight operations on adjacent communities. This examination establishes a background for relating land use to noise levels and accident potential and identifies those uses which are compatible with flight operations.

This study is also intended to provide the basis for continued cooperation between Mather AFB and the local community in planning for the future.

The body of this report consists of the following:

a. A description of Mather AFB, including its current units and missions, and the economic role played by the base.

b. A description of the AICUZ concept, including its historical development, principles, methodology, land use guidelines, and application.

c. A delineation of the Mather AFB AICUZ area and discussion of land use compatibility guidelines as applied to current and projected land use near the base.

d. A discussion of Air Force responsibilities and Mather AFB actions.

e. Recommendations for local action by surrounding jurisdictions.

II. MATHER AIR FORCE BASE AND THE COMMUNITY

THE BASE

Mather AFB is located approximately 12 miles east of the city of Sacramento, California in the County of Sacramento, adjacent to the unincorporated community of Rancho Cordova.

The base consists of approximately 5,900 acres which includes two runways, taxiways, ramps, industrial areas, housing, recreational facilities, and undeveloped areas. The undeveloped areas are the minimum required to form a barrier between the base and the surrounding community for safety and security, and to permit some room for future development.

Mather AFB is literally a small community within itself, with a working population of about 6,900 military and civilian personnel. The total base population, including dependents, is over 13,900 people. A summary of the economic impact Mather AFB has on the local community can be found in Appendix B.

MISSION

The Mather AFB mission is described in Appendix A.

HISTORY

In October 1917, the Sacramento Chamber of Commerce launched a campaign for Sacramento to be chosen as a site for the training of Army aviators. Land was obtained in February 1918 by the Chamber of Commerce and presented to the United States Government by the community of Sacramento. Construction of the base began the following month. On 2 May 1918, the installation was named in memory of Second Lieutenenat Carl Spencer Mather, who was killed in an air training crash near Ellington Field, Texas, in January 1918.

The first aviators arrived at Mather Field on 8 June 1918, and the first flight from the base was made four days later. Flight training was discontinued with the graduation of the 14th class on 8 January 1919. In the months that followed, activities were reduced to mostly caretaker duties with occasional air patrols by the forestry service. In June 1922, the field was inactivated. Mather Field was reopened on 3 March 1930 in preparation for the "War Games" held by the Air Corps the following month. Among those participating in the maneuvers were such Air Force greats as Henry "Hap" Arnold, Carl Spaatz, and Curtis LeMay. On 1 November 1932, Mather Field was again inactivated.

Reactivated in 1941, Mather Field was rebuilt as a school for pilot and navigator training. In 1944, the base became a port of aerial embarkation--and later a port of debarkation--under the Air Transport Command, and many additional facilities were built. Most of the B-29's used against Japan in World War II departed from Mather. To handle the big bombers, runways were lengthened and reinforced. Mather Field resumed its training mission in December 1945, becoming the first and only school for navigator-bombardiers (then called "observers") and the first class entered in March 1947.

An important milestone in Mather's history was established in 1958 when Strategic Air Command (SAC) activated and assigned the 4134th Strategic Wing to Mather as a tenant organization. More than $20,000,000 was spent to construct additional buildings and other facilities for the SAC operation. On 1 February 1963, the 320th Bombardment Wing (Heavy) was activated and assigned to Mather, replacing the 4134th Strategic Wing, which was inactivated.

In 1961, electronic warfare officer training was transferred to Mather from Keesler AFB, Mississippi. By August 1961, electronic warfare upgrade, refresher, and familiarization training courses were being taught. Formal electronic warfare officer training began on 2 January 1962. A new electronic warfare laboratory and classroom complex was dedicated on 17 April 1962.

In 1964, the undergraduate navigator training (UNT) was relocated to Mather from James Connally AFB, Texas. This action unified all related navigator training into one composite mission under the 3535th Navigator Training Wing. The first Mather UNT class commenced on 9 August 1965. All Air Force training in navigation, radar bombardment, and electronic warfare is now being accomplished at Mather AFB.

On 1 April 1973, the 3535th Navigator Training Wing was inactivated and the navigator training mission was assumed by the 323d Flying Training Wing. This change in organization marked the beginning of revolutionary changes in the concept of undergraduate navigator training.

Under a new course concept called "Undergraduate Navigator Training System," jet aircraft were used for the first time in undergraduate navigator training. Additionally, the new course incorporated a complex of highly sophisticated simulators as part of the improved instruction.

After more than 20 years of operation, the Convair T-29 "Flying Classroom" for navigator training was phased out in March 1975. The phase out of the T-29 began with the arrival of the new jet powered Boeing T-43 Airborne Navigator Trainer aircraft in September 1973. A year later, the Cessna T-37 jet trainer was introduced to the navigation training program.

The first complex of the T-43 Undergraduate Navigation Training Ground Simulator was delivered by the Honeywell Corporation on 13 December 1974. This training system combined a variety of commercial computers, rotating memory devices, and peripheral electronic equipment with highly specialized digital processing data, handling and interface equipment. The T-45 simulator, consisting of 13 complexes each with four student stations, significantly improved the effectiveness of undergraduate navigator training through realistic simulations of navigation, radar, instrumentation, and radio aids.

Undergraduate navigator training for the U.S. Navy and U.S. Coast Guard, and support of the Marine Aerial Navigation School--which relocated to Mather from Corpus Christi, Texas--was assumed by the 323d Flying Training Wing in July 1976. With the establishment of the interservice undergraduate

navigator training program, the 323d Flying Training Wing became the only navigation training wing to provide undergraduate and advanced navigator training to all services under the Department of Defense.

For the first time in Air Force history, six Air Force women officers were admitted to undergraduate navigator training on 10 March 1977. Additionally, a U.S. Coast Guard woman pilot entered the interservice undergraduate navigator training program on 12 May 1977. The women navigators were graduated in a combined ceremony on 12 October 1977.

On 13 May 1978, Mather AFB celebrated its 60th anniversary with an open house for the general public. Approximately 100,000 people came to see the various displays and to witness an aerial demonstration by the U.S. Navy "Blue Angels" team. On 19 May 1978, the first T-43 undergraduate navigator training mission was flown to Hawaii. On 28 August 1978, General John W. Roberts, the commander of Air Training Commander (ATC), dedicated the Mather AFB Silver Wings Avaiation Museum. The theme of this museum was to depict the story of navigation and general aviation, focusing on Northern California. The museum was opened to the public on 23 September 1978.

In 1981 the 323d Flying Training Wing received its fourth Air Force Outstanding Unit Award for performing its unique navigator training mission in an outstanding manner and exceptionally meritorious service from 1 January 1980 to 30 April 1981. On 6 November 1979, a much needed new commissary was opened for business. Also, a new solar heated/cooled Consolidated Base Personnel Office was completed in 1980.

THE ADJACENT COMMUNITY

In 1950 what is known as the community of Rancho Cordova was still an agricultural area. The most significant land feature was the extensive mounds of dredger tailings left over from the gold recovery methods of earlier days. The only major activity was Mather AFB. Today, Rancho Cordova is a highly urbanized complex of living, working, and playing areas.

In the mid-1950's residential construction began to meet the needs of workers employed by Mather AFB and the new aerospace industries of the Aerojet General Corporation and Douglas Aircraft Corporation. By 1960 some 12,660 persons were living in the community of Rancho Cordova with another 5,646 living on Mather AFB. This population increase was the result of space-defense industry expansion and the increase of the Mather AFB mission. Almost all of these new jobs relied on government contracts and Federal budget decisions.

The community of Rancho Cordova is about 54 square miles in size and has a population of approximately 73,000. The projected population for 1990 is 200,000. Almost one-half of the community of Rancho Cordova is comprised of retired or active duty military members and their families. Major industries in Rancho Cordova include Mather AFB, Aerojet General Corporation, Lone Star Industry, Kaffman & Broad Home Systems, PM&I Manufacturers, and Franklin Electric Co.

COMMUNITY RELATIONSHIPS

Tours of duty at Mather AFB are relatively long and many Air Force personnel have taken the opportunity to reach out into the life of the community. Community participation is enhanced by the fact that more than half of the overall assigned military personnel live in the local community. (Economic Impact Study contained in Appendix B.)

Many Mather people serve as scout leaders and counselors, and are deeply involved in church work as teachers and youth leaders, and in some cases, as pastors.

Some military couples are foster parents, and many Mather men and women serve as Big Brothers/Sisters in the community. Mather has representatives on local PTA groups and others assist in youth sport programs, such as Little League. Through informal surveys, it has been determined that over 1,000 military personnel and civilian employees are volunteers in these activities.

During the summer, Mather AFB employs approximately 200 minority students, funds permitting. Others are employed under the stay-in-school program, including educable mentally retarded youths and youths from disadvantaged families.

A summer youth encampment provides occupational exposure experience to over 80 disadvantaged boys and girls, 14 to 17 years old. During the five-day encampment they are given dental and medical examinations.

The USAF Hospital at Mather AFB has been made available to the community in many major areas. Annually, 10 dental assistant students of Sacramento City College gain practical experience while offering Mather dentistry which otherwise would not be available. About 55 nursing students per year from local schools gain practical experience in the wards of the Base Hospital. About 11 resident medical students from the University of California at Davis have trained at the hospital within the last year. Also, there have been approximately 15 civilian employee training aids used.

Mather AFB personnel contributed over a quarter of a million dollars to the 1981 Sacramento Combined Federal Campaign.

The annual "Santa in Blue" campaign is a traditional volunteer effort to assist the Sacramento Children's Home activities. A large portion of the collected donations augment the school's scholarship fund to help graduating high school seniors with their initial college expenses. Mather's Operation Santa Claus collects food, clothing, and toys for improverished families throughout the community.

The Mather AFB Fire Department has a mutual aid agreement with Sacramento County.

III. THE AICUZ CONCEPT, PROGRAM AND METHODOLOGY

BACKGROUND

Federal legislation, national sentiment, and other external forces have served to greatly increase the Air Force role in environmental planning issues. Problems of airfield encroachment, noise, air and water pollution, and socio-economic impacts require continued and intensified Air Force involvement. The nature of these problems dictate Air Force participation in the process of comprehensive community and land use planning. Effective coordinated planning which bridges the gap between the Federal government and the local citizen, requires the establishment of good working relationships with local communities and planning officials which, in turn, depends upon creating an atmosphere of mutual trust and cooperation. The Air Installation Compatible Use Zone (AICUZ) concept has been developed to protect local citizens from the noise and accident hazards associated with flying activities and to prevent degradation of mission capability from encroachment.

AICUZ is a refinement of the Air Force "Greenbelt" concept, an environmental protection program begun in 1971. The "Greenbelt" called for a two and one-half mile long by two mile wide rectangle at the end of each runway to be completely uninhabited. For legal and practical reasons the more refined AICUZ concept replaced the "Greenbelt" in 1973 following the Department of Defense adoption of AICUZ for all military airfields.

The AICUZ uses the latest technology to assess noise levels and a statistical analysis to determine aircraft accident potential zones. Height obstruction regulations developed by the Air Force and the Federal Aviation Administration are also considered. This information is presented as Clear Zones (CZ's), Accident Potential Zones (APZ's), Noise Zones (NZ's), and height and obstructions criteria. CZ's and APZ's are based on a statistical survey of major Air Force aircraft accidents within 10 miles of airfields between 1968 and 1972. NZ's are expressed in Day/Night Average Sound Level (DNL), with NZ contour lines developed by a computer. Height and obstructions criteria were developed to permit safe aircraft operation in the airfield vicinity.

Development of the AICUZ requires a study of the types of aircraft which use a base, where they fly, how high they fly, how many times they fly over a given area, and the time of day or night they operate. Data from this study is used to change air base flying operations as much as possible to reduce noise exposure and to develop the APZ's and NZ's for each base.

The APZ's and NZ's are overlaid on a map to form Compatible Use Districts (CUD's), the basic building block for land-use planning with AICUZ data. A wide variety of compatible land uses in each CUD are specified. Recommendations on building materials and standards to reduce noise levels inside structures are provided.

In the Clear Zones, risk of an aircraft accident is much higher than in any of the CUD's. CZ land use controls must be so restrictive that it is Air Force policy to request funds from Congress to acquire the necessary real property interest by fee or as an easement to give the Air Force control over the use of property within these zones. Real property interests in Mather AFB Clear Zones have been acquired by the Air Force to prevent incompatible land use and promote safety.

Guidelines for compatible land uses within the CUD's are shown in Figure IV-2. These guidelines are flexible to allow reasonable economic use of the land in the Mather AFB environs. The aims of the guidelines are to limit high people densities in those areas where the highest accident potential and noise levels exist, and to recommend noise level reduction measures in high noise areas. Height and obstructions criteria, which should be considered in conjunction with the CUD's are presented in Appendix E. Precautions should be taken to ensure that new structures will not protrude above the planes or elevations defined by the criteria.

This study is provided as a service to communities adjacent to Mather AFB. Technical data on air base operations has been provided in the form of AICUZ recommendations so that each community may take the steps necessary to provide land use management compatible with air base operations. Utilization of AICUZ data by each community will be a continuation of the long and prosperous relationship between Mather AFB and its surrounding civilian neighbors.

AIR FORCE POLICY

It is Air Force policy to work toward achieving compatibility between air installations and neighboring civil communities by means of a compatible land use planning and control process conducted by the local community. The system for identifying and assessing land use compatibility is derived from the AICUZ concept. This concept embodies a process of projecting, mapping and defining aircraft noise and accident potential areas within the air base environs. Land use compatibility guidelines are applied to these areas and serve as the basis for Air Force recommendations to the communities for use in their land use planning and control process.

Air Force commanders at the major command and base level establish and maintain active programs to achieve the maximum feasible land use compatibility between air installations and neighboring communities. The program requires that all appropriate governmental bodies and citizens are kept informed of Air Force views whenever AICUZ or other planning matters affecting the installation are under consideration. This includes positive and continuous programs designed to:

1. Provide information, criteria and guidelines to state, regional, and local planning bodies, civic associations, and similar groups.

2. Inform such groups of the requirements of the flying activity, noise exposure, aircraft accident potential and AICUZ plans.

3. Describe the noise reduction measures which are being used.

4. Ensure that all reasonable, economical and practical measures are taken to reduce or control Air Force noise producing activities. These measures include such considerations as proper location of engine test facilities, providing sound suppressors where necessary, and adjustment of flight patterns and/or techniques to minimize the noise impact on populated areas. This must be done without jeopardizing safety or operational effectiveness.

The AICUZ consists of land areas upon which certain land uses may obstruct the airspace or otherwise be hazardous to aircraft operations, and land uses which are exposed to the health, safety, or welfare hazards of aircraft operations. The AICUZ includes:

1. Accident Potential Zones (APZ's) based on past Air Force aircraft accidents.

2. Noise Zones (NZ's) produced by the computerized Day-Night Average Sound Level (DNL) methodology.

3. The area designated by the Federal Aviation Administration (FAA) and the Air Force for purposes of height limitations in the approach and departure zones of the base.

FLYING OPERATIONS

In order to describe the relationship of aircraft operations with land use, it is necessary to fully evaluate the exact nature of flying activities. An inventory and analysis of current Mather AFB flying operations has been performed and includes such things as what kinds of aircraft use the base, where the aircraft fly, how high they fly, how many times they fly over a given area, and what time of day they operate.

Presently, Mather AFB has a vital flying mission consisting of navigator training in the T-37 and T-43 aircraft. The 320th Bombardment Wing, a Strategic Air Command (SAC) tenant unit, fulfills an alert commitment flying B-52 and KC-135 aircraft. Another tenant unit, the 940th Air Refueling Group (Reserve), provides SAC with KC-135 aircraft support. The majority of flying activities are considerable distance away from the airfield and the primary concern is departures and arrivals; 95 percent of which are made to runways 22 Left and 22 Right.

The principal jet aircraft presently operating from Mather AFB and the average daily number of operations by type of aircraft are shown below. Figures are rounded to the nearest whole aircraft/percentage.

TYPE OF AIRCRAFT	DAILY OPERATIONS	PERCENTAGE
T-37	80	71
T-43	16	14
B-52	7	6
KC-135	10	9
Total	*113	100

*Figures represent total number of aircraft operating each day.

These aircraft use four basic flight patterns: (See Figure III-1.)

1. Standard instrument departures (SID).

2. Straight-in arrivals.

3. Modified straight in arrivals.

4. Overhead landings.

Flight tracks for Mather AFB are the composite result of several factors, including:

1. Departure and arrival patterns designed to avoid heavily populated areas.

2. Air Force criteria governing the speed, rate of climb, and turning radius for each aircraft.

3. Proximity to hills and mountains which preclude operations in certain areas.

Operations are coordinated with the Federal Aviation Administration (FAA) and flight paths are integrated to minimize conflict with civilian aircraft operations at Sacramento Executive Airport and Sacramento Metropolitan Airport, and military operations at McClellan Air Force Base. Efforts are continually expended to control and schedule missions to keep noise levels to a minimum, especially during night periods. Flight corridors have been selected to minimize community disturbances and public reactions. Pilots are exposed to public needs through flying safety training and standardization meetings.

California Air National Guard (CANG), a tenant organization, also routinely performs helicopter activities at Mather AFB. Additionally, transient aircraft from nearby military bases occasionally conduct training activities at Mather AFB.

AIRFIELD ENVIRONS LAND USE PLANNING DETERMINANTS

Airfield environs planning is concerned with three primary determinants: (1) accident potential to land users; (2) aircraft noise; and (3) hazards to operations from land use (height, obstructions, etc.). Each of these considerations is addressed in detail using "state of the art" description and evaluation of systems.

ACCIDENT POTENTIAL ZONES

Of the three planning determinants cited above, accident potential is perhaps the most critical, but in the past has been the least defined. Hazards of ground uses are not well covered by FAA and Air Force criteria.

Accident potential as discussed here considers where most accidents have historically occurred at many Air Force bases. The results of this approach do not produce accident probability statistics. The question of probability involves too many variables for an accurate predition model to be developed. Therefore, the analysis of the Air Force accident history focuses on determining where, within the airfield environs, an accident is likely to take place and how large an impact area will likely result from any single accident.

Prior concern for accident potential focused on approach-departure zones, but this method did not completely describe the accident problem. A technique that more accurately depicts and analyzes the actual critical accident hazard areas has been developed for Air Force use and is explained in Appendix C.

At both ends of the Mather AFB runways expanded Clear Zones (CZ's) and two Accident Potential Zones (APZ's) have been designated as depicted in Figure III-2. Within the Clear Zone area the overall risk is so high that the necessary land use restrictions would prohibit reasonable economic use of the land. The Air Force has acquired the necessary real property interest in this area to prevent incompatible land uses.

Accident Potential Zone I is less critical than the Clear Zone but still possesses a significant risk factor. This area varies from 3,000 to 4,000 feet wide (depending on the runway) and 5,000 feet long, has land use compatibility guidelines which are sufficiently flexible to allow reasonable economic use of the land.

Accident Potential Zone II is less critical than APZ I but still possesses some risk. APZ II also varies from 3,000 to 4,000 feet wide and 7,000 feet long. The accumulative length of the CZ, APZ I and APZ II extends the end of APZ II to 15,000 feet from the runway threshold.

NOISE ZONES

In a study of airport and aircraft noise, two different types of noise measures are needed - one to measure the noise of individual noise events such as the noise of an individual aircraft flyover, and another to describe the noise environment resulting from a complex of noise events, such as the total noise effect of aircraft operations at an air base. See Figures III-3 for Mather AFB noise zones.

The methodology used to produce the noise contours contained in this study consists of the Day-Night Average Sound Level (DNL) system to depict the noise environment. This method of assessing the noise impact of aircraft operations on the area surrounding airfields is replacing the Noise Exposure Forecast (NEF) which was used on an interim basis by the Air Force to replace the Composite Noise Rating (CNR) system which was published by the Air Force in 1964. Continuing efforts to improve the CNR procedure over the last ten years resulted in the development of NEF. Efforts to provide a national uniform standard for noise assessment have recently resulted in the announcement by the Environmental Protection Agency that DNL will be the standard. In the same way as CNF, NEF and DNL are methods of assessing the amount of exposure to aircraft noise and predicting the community response to the various levels of exposure. The Day-Night Average Noise Levels (L_{dn}) used for planning purposes and for which contours are shown in Figure III-3 are 65, 70, 75, and 80. Land use guidelines are based on the compatibility of various land uses with these noise exposure levels. For broad planning purposes, NEF 30, L_{dn} 65, and CNR 100 may be considered equivalent, as may NEF 40, L_{dn} 74, and CNR 115. However, due to technical differences in the three systems, direct comparison or conversion from one system to another can be misleading and is not recommended. Details concerning the DNL methodology are presented in Appendix D.

HEIGHT OBSTRUCTIONS AND OTHER CONSIDERATIONS

Although height and obstruction criteria in the vicinity of airports have been established for most airfields, including Mather AFB, it is appropriate to mention these criteria in this report. Where such criteria are not included in local community land use planning, there is a possibility that uses could be permitted which would endanger safe aircraft operations.

Appendix E contains the basic Air Force height and obstruction criteria. The land area outlined in Appendix E for height obstruction criteria should be regulated to prevent uses which might otherwise be hazardous to aircraft operations. The following uses should be restricted and/or prohibited:

1. Uses which release into the air any substance which would impair visibility or otherwise interfered with the operations of aircraft, e.g., steam, dust, and smoke.

2. Uses which produce light emissions, either direct or indirect (reflective), which would interfere with pilot vision.

3. Uses which produce electrical emissions which would interfere with aircraft communication systems or navigational equipment.

4. Uses which would attract birds or waterfowl such as operation of sanitary landfills or maintenance of feeding stations.

BASIC LAND USE COMPATIBILITY

Although research with reference to aircraft accident potential noise and land use compatibility is still in progress by a number of agencies and groups, it is possible to establish guidelines which can be incorporated into

the land use planning process (Figure IV-2). These compatibility guidelines must not be considered as definitive or inflexible standards. They are the framework within which land use compatibility questions can be addressed and resolved. In each case, full consideration must be given to local conditions, such as: previous community experience with aircraft accidents and noise; local building construction and development practices; existing noise environment due to other urban or transportation noise sources; time period of aircraft operations and land use activities; specific site analysis and; noise buffers, including topography. These basic guidelines cannot resolve all land use compatibility questions, but offer a framework within which to work.

ACCIDENT POTENTIAL

Land use guidelines for the two APZ's are based on a hazard index system which compares the relationship of accident occurrence for five areas:

1. On or adjacent to the runway.

2. Within the Clear Zone.

3. In APZ I.

4. In APZ II.

5. In all other areas within ten nautical mile radius of the runway.

Accident potential "on or adjacent to the runway" or within the Clear Zone is so high that few uses are acceptable, while the risk outside APZ I and APZ II, but within the ten nautical mile radius area, is not significant enough to warrant special attention.

Land use guidelines for APZ's I and II have been developed. The main objective has been to restrict all people-intensive uses because there is greater risk in these areas. The basic criterion for APZ I and APZ II land use guidelines is the prevention of uses which:

1. Have high residential density characteristics.

2. Have high labor intensity.

3. Involve explosive, fire, toxic, corrosive or other hazardous characteristics.

4. Promote population concentration.

5. Involve utilities and services where disruption would have an adverse impact (telephone, gas, etc.)

6. Concentrate people who are unable to respond to emergency situations, such as, children, elderly, handicapped, etc.

7. Promote extended duration of population concentration.

8. Pose hazards to aircraft operations.

Accident Potential Zone I has compatibility with a variety of industrial/manufacturing, transportation, communication/utilities, wholesale trade, open space recreation and agricultural uses. However, uses that concentrate people in small areas are not acceptable. Structures should be located toward the edges of this zone wherever possible.

Accident Potential Zone II possesses lower accident potential, but risk is still present. Acceptable uses include those of Accident Potential Zone I, and personal and business services of low intensity or scale of operation. High density functions such as multi-story buildings, places of assembly (theaters, churches, schools, restaurants, etc.) and high density office uses are not considered appropriate.

High people densities should be limited to the maximum extent possible. For most uses, buildings should be limited to one story and the lot coverage should not exceed 20 percent.

NOISE

Most studies on residential aircraft noise compatibility recommend no residential uses in noise zones above L_{dn} 75 (or its equivalent in other noise descriptor systems). Usually no restrictions are recommended below L_{dn} 65. Between L_{dn} 65-75, there is currently no consensus. These areas may not qualify for federal mortgage insurance in residential categories according to 24CFR, Part 51 of the Code of Federal Regulations (adopted July 12, 1979). In many cases, Housing Urban Development's (HUD) approval requires noise attenuation measures, the Regional Administrator's concurrence and an Environmental Impact Statement. Past Air Force experience, and the lack of definitive criteria, does not justify an Air Force recommendation to categorically prohibit residential uses in these areas, although these uses may be undesirable. However, wherever possible, residential use should be located below L_{dn} 65.

Most industrial/manufacturing uses are compatible in the airfield environs. Exceptions are uses such as research or scientific activities which require lower noise levels. Noise attenuation measures are recommended for portions of buildings devoted to office use, receiving the public, or where the normal background noise level is low.

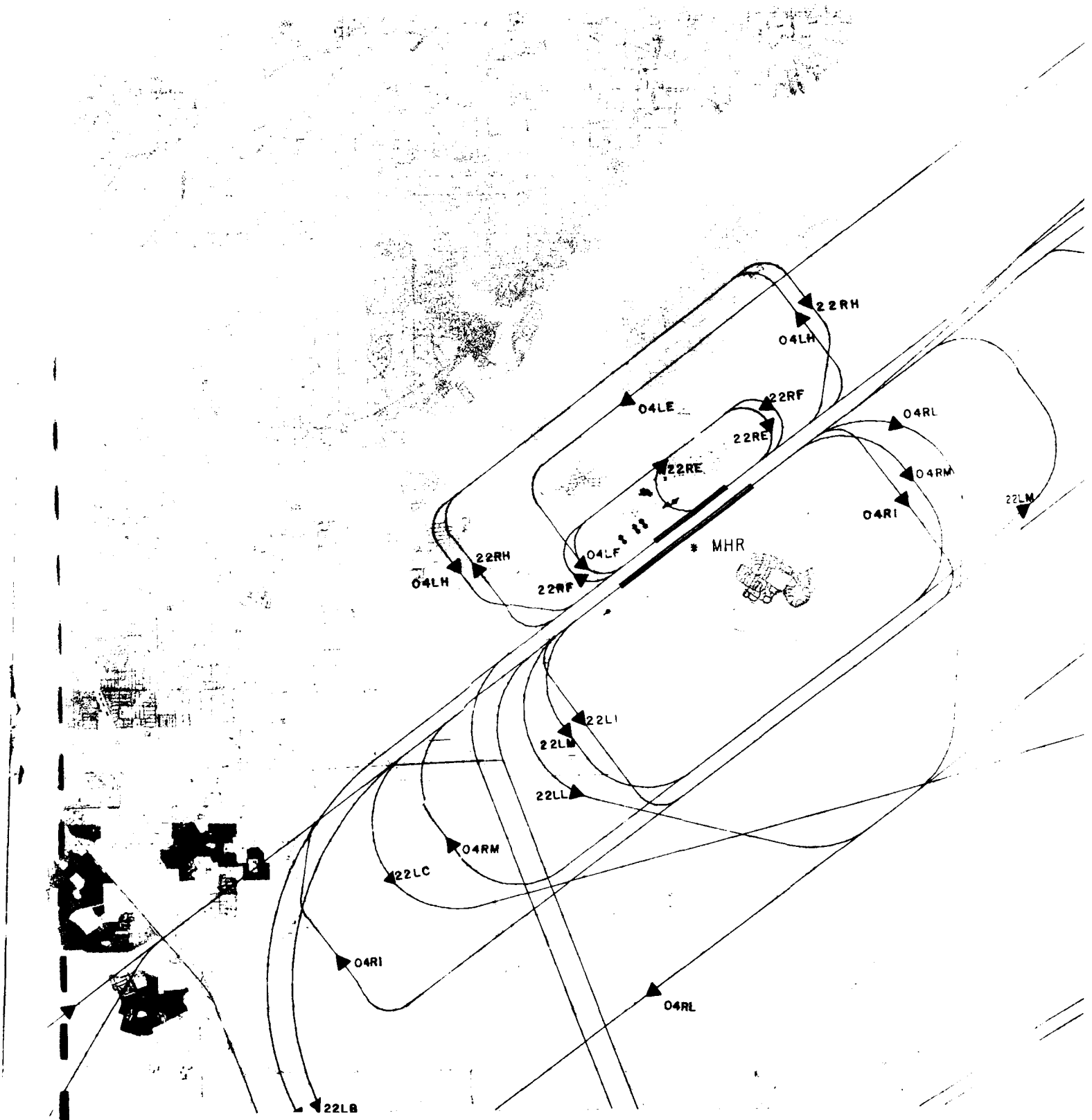
The transportation, communications, and utilities categories have a high noise level compatibility because they generally are not people intensive. When land is used for these purposes, the use is generally very short in duration. Where buildings are required for these uses, additional evaluation is warranted.

The uses of commercial/retail trade and personal and business services categories are compatible without restriction up to L_{dn} 70; however, they are generally incompatible above L_{dn} 80. Between L_{dn} 70-80, attenuation should be included in the design and construction of buildings.

The nature of most uses in the public and quasi-public services category requires a quieter environment, and attempts should be made to locate these uses below L_{dn} 65, or provide adequate attenuation.

Areas where noise levels exceed 75 L_{dn} are not generally recommended for recreational uses. Buildings associated with golf courses and similar uses should be sound attenuated.

With the exception of forestry activities and livestock farming, uses in the resource production, extraction and open space categories are compatible generally without restriction.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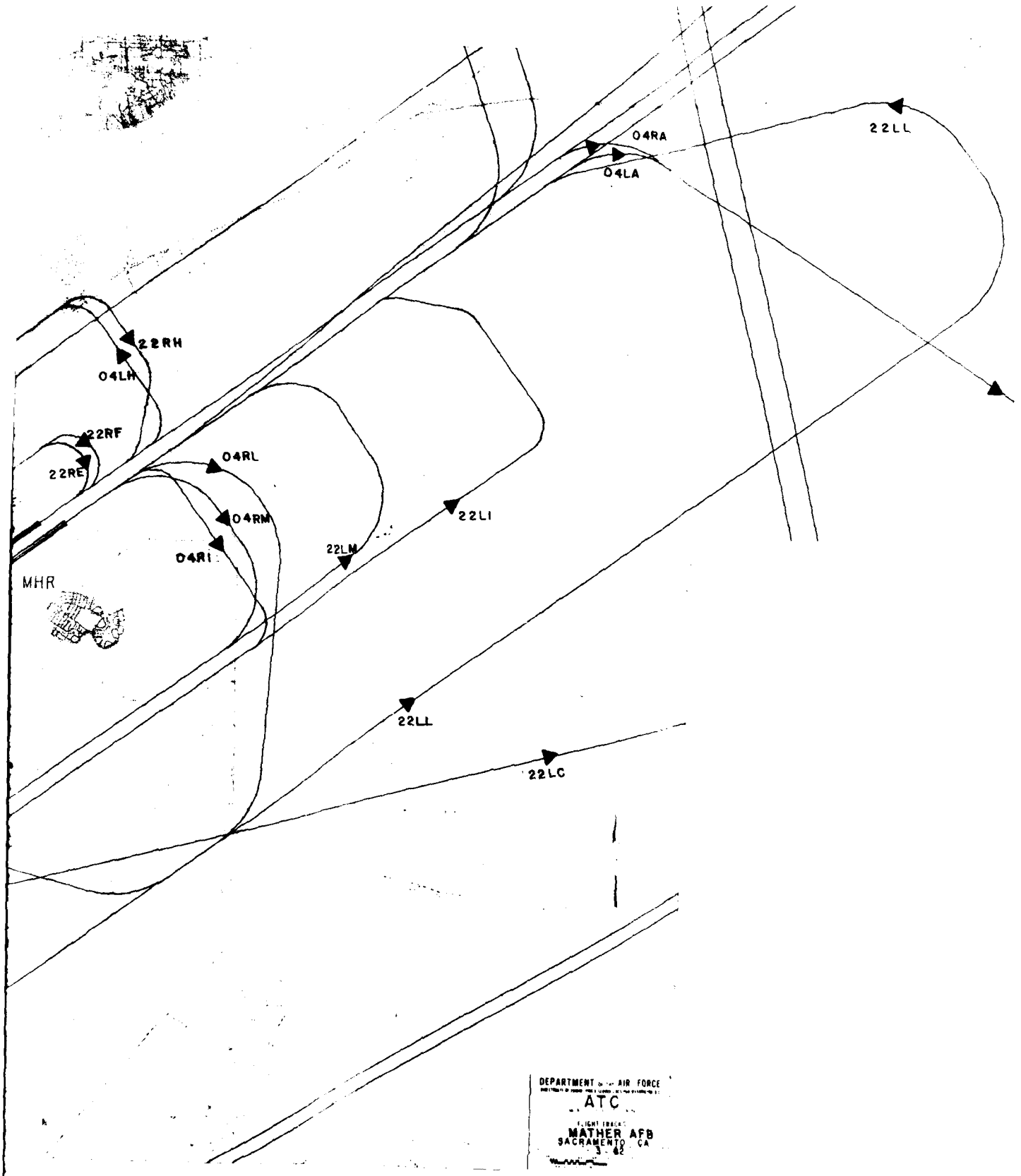
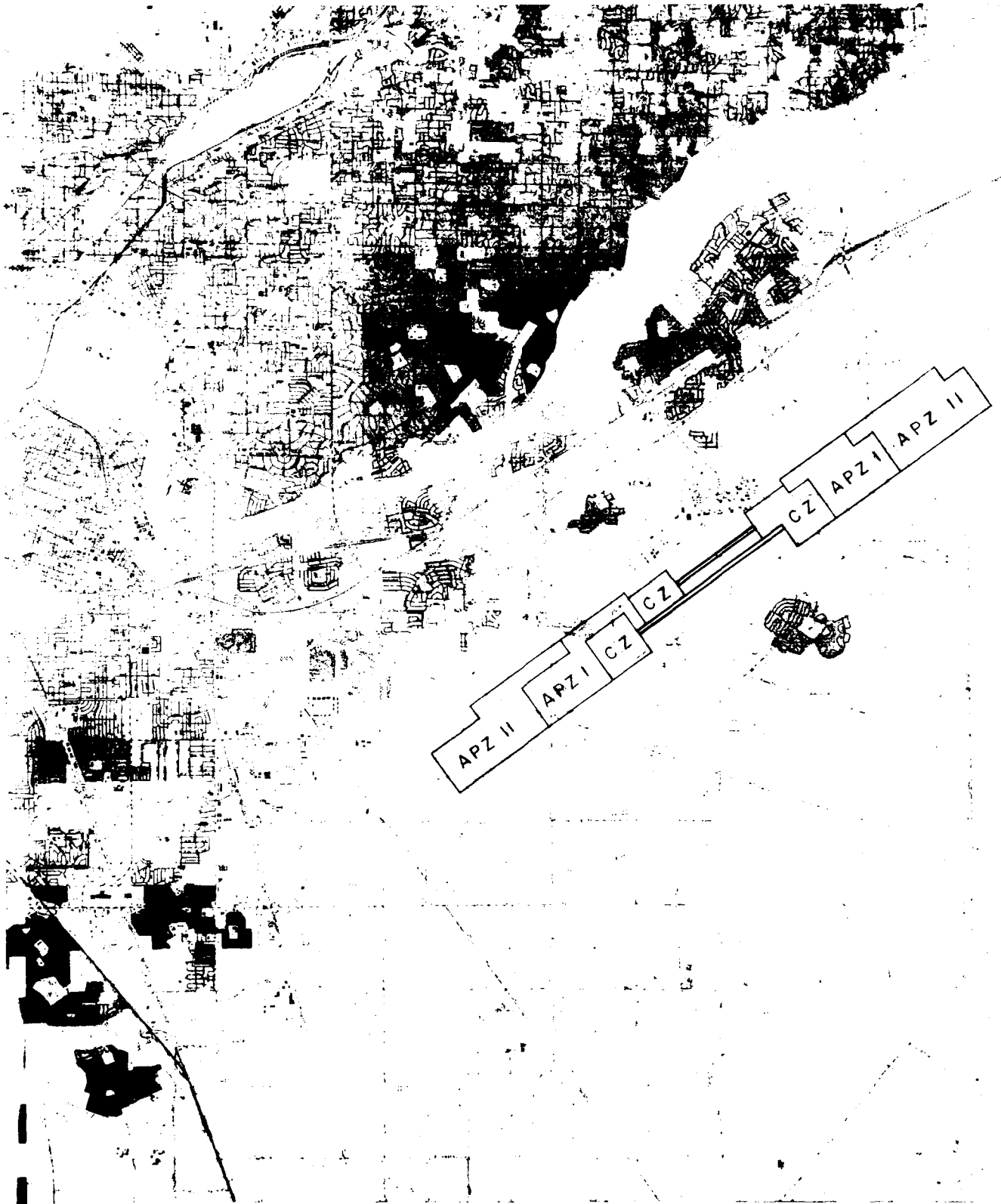


2 FIG. III-1 PAGE III-10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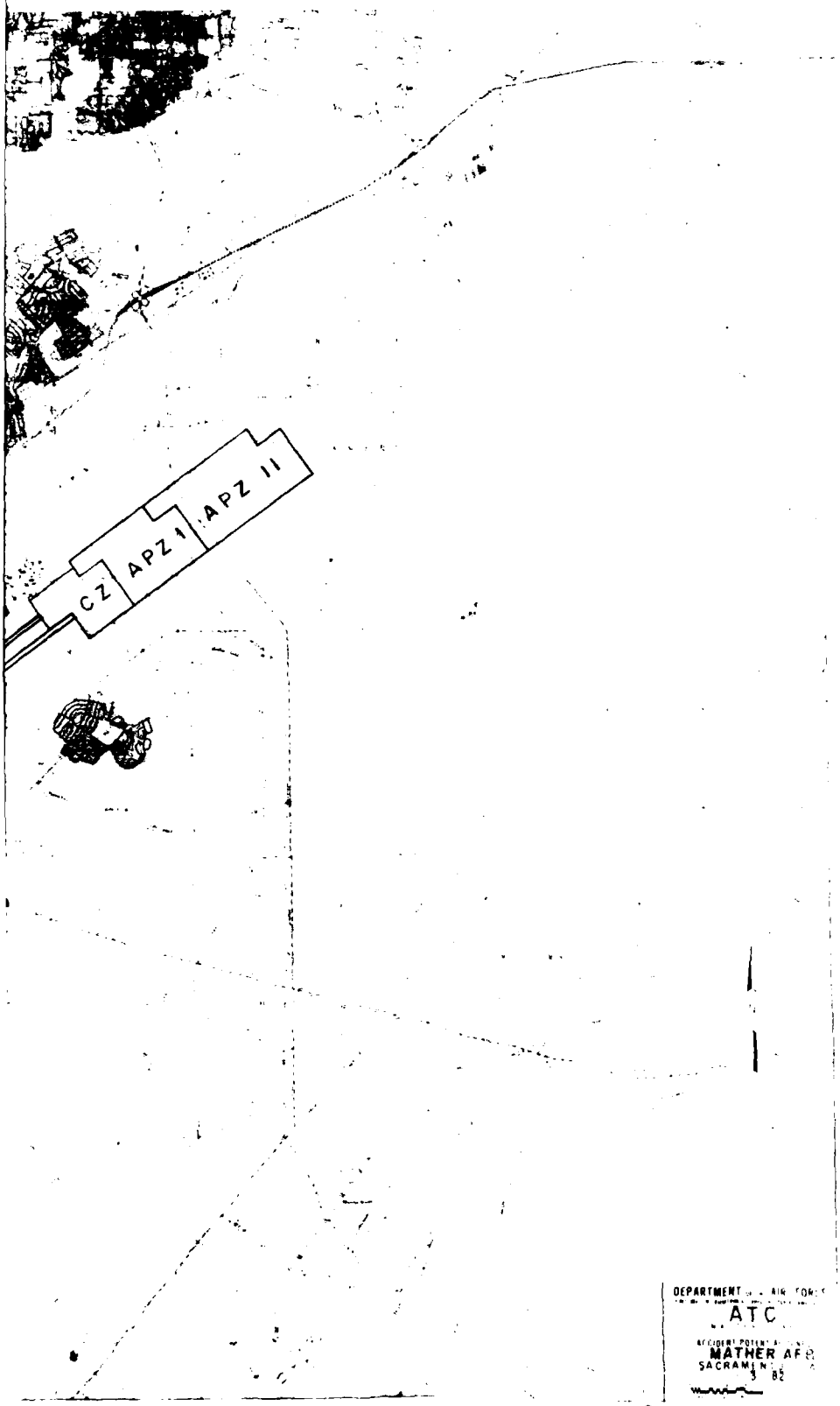
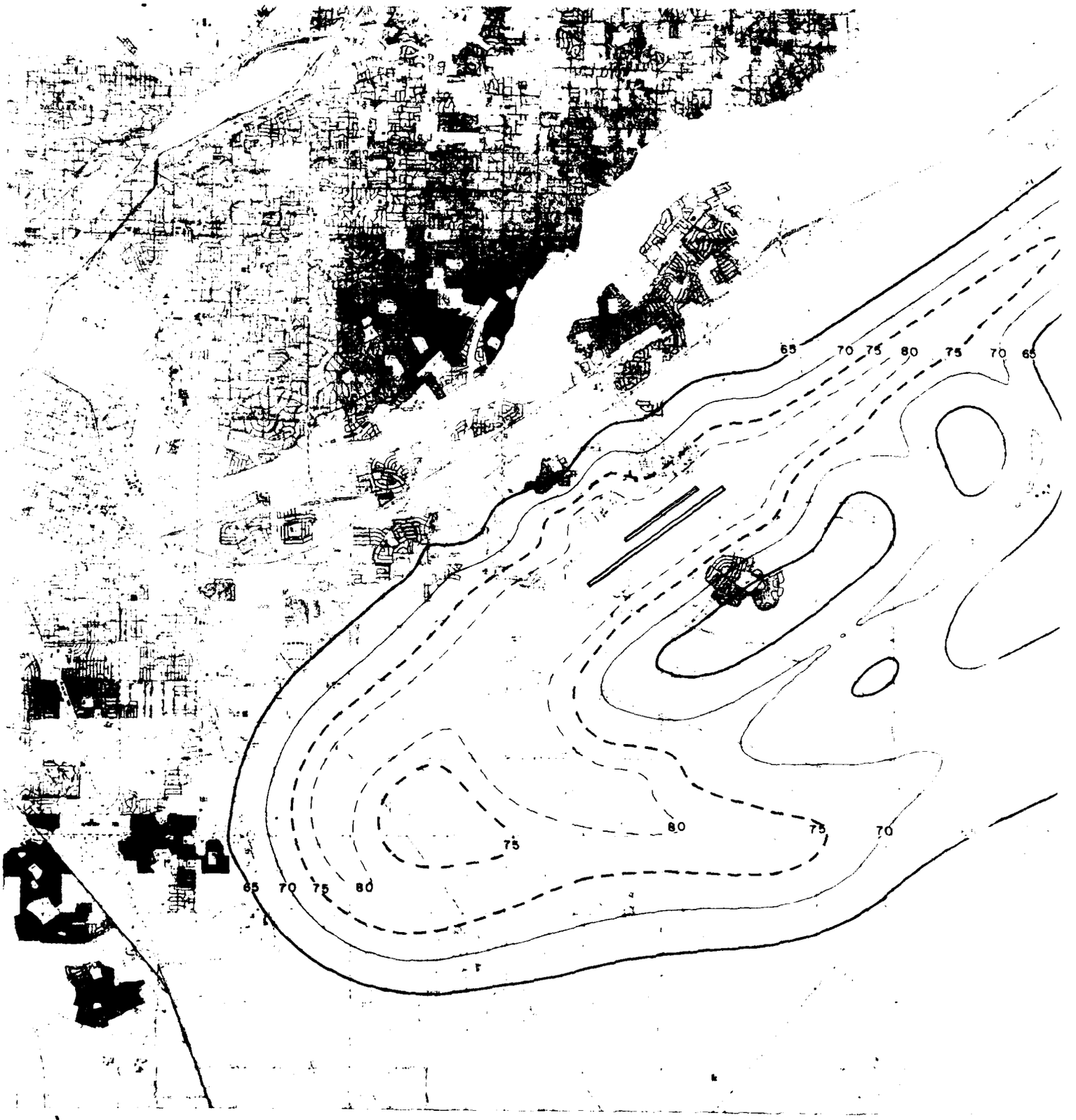


FIG. III-2 PAGE III-11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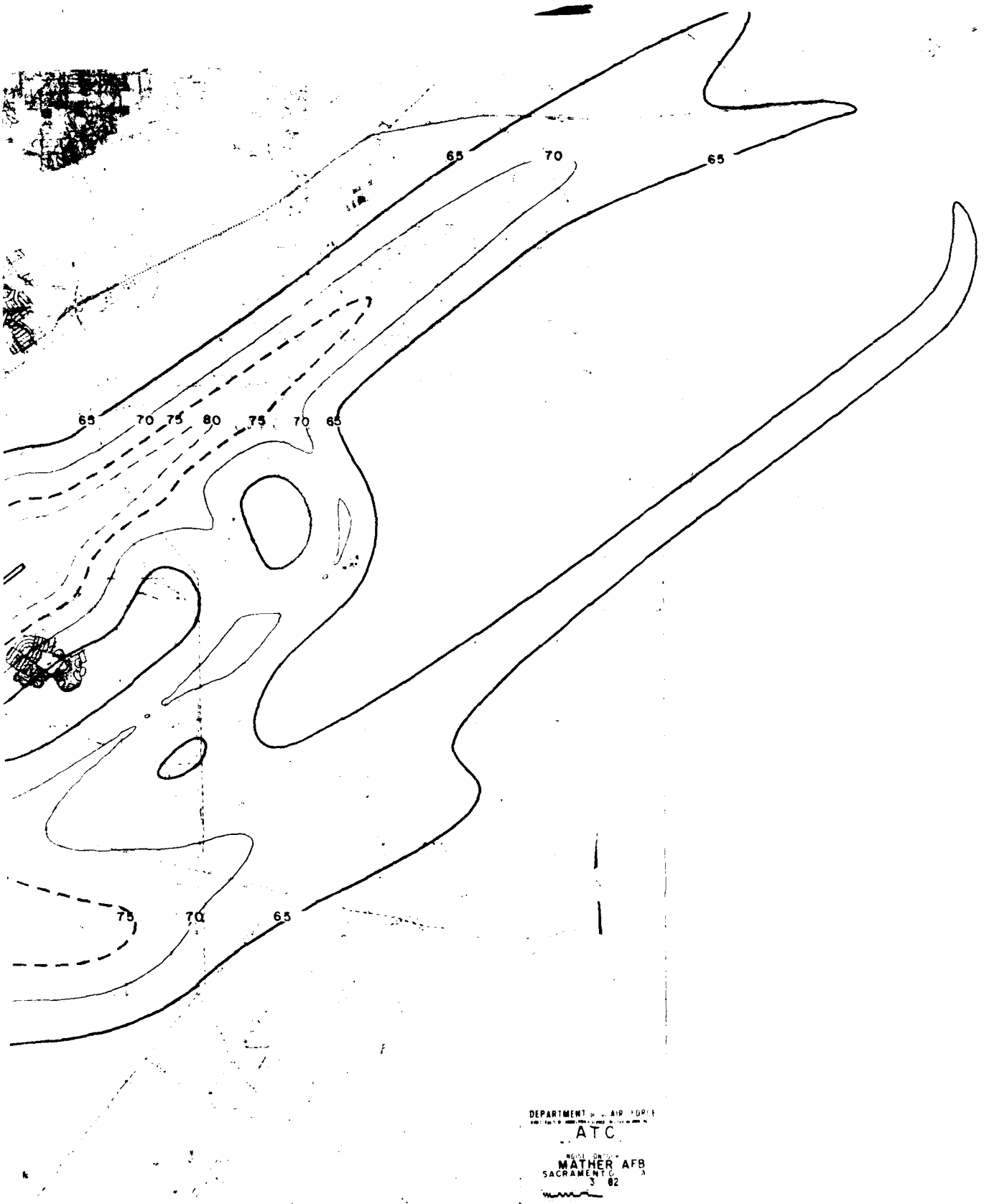


FIG. III-3 PAGE III-12

IV. THE MATHER AIR FORCE BASE AICUZ

THE AICUZ AREA

The Mather AFB AICUZ (Figure IV-1) and Land Use Compatibility Guidelines (Figure IV-2) are similar to other land use determinants. Like any other factor in the planning process, the AICUZ depicts the relationship between a land use determinant and land use. In this case, it is the relationship of aircraft operations to land use. The recommended AICUZ land use guidelines are considered suitable for incorporation into the local planning process.

The boundaries of a compatible use area (i.e., an AICUZ) for an airfield are dependent upon many factors affecting the public health, safety, and welfare as discussed in Chapter III. Because land use planning must be comprehensive, it must embrace all areas affected by a given determinant.

One set of land use guidelines within a large compatible use area would be impractical and unreasonable. Recognizing this fact, it is necessary to identify areas which adequately reflect the combined effects of noise, flight tracks, altitudes, and accident potential. The term Compatible Use District (CUD) has been given to these areas within an AICUZ. In effect, a CUD is an area which possesses a distinct range of noise levels and specific accident potential. It forms the basic "building block" for compatible land use. There are thirteen basic CUDs and two supplemental CUDs in the AICUZ criteria. Ten CUDs now apply to the Mather AFB AICUZ. The applicable CUDs are indicated below with an asterisk (*):

CUD 1	L_{dn} 85+
*CUD 2	APZ I and L_{dn} 80-85
*CUD 3	APZ I and L_{dn} 75-80
*CUD 4	APZ I and L_{dn} 70-75
CUD 5	APZ I and L_{dn} 65-70
CUD 5a	APZ I
*CUD 6	L_{dn} 80-85
*CUD 7	L_{dn} 75-80
*CUD 8	APZ II and L_{dn} 80-85
*CUD 9	APZ II and L_{dn} 75-80
*CUD 10	APZ II and L_{dn} 70-75
CUD 11	APZ II and L_{dn} 65-70
*CUD 12	L_{dn} 70-75
*CUD 13	L_{dn} 65-70

Land use guidelines for each CUD are shown in Figure IV-2. These guidelines have been established on the basis of studies prepared or sponsored by several federal, state, and local agencies. Because the types of land uses specified for each CUD are generalized through the use of Housing Urban Development's (HUD) Standard Land Use Classification, there may be specific uses that are appropriate even though the general use category is not, and vise versa. Consequently, Figure IV-2 is only a guide and must be adapted to local conditions on a case-by-case basis.

Land use planning and control is a dynamic rather than a static process. The specific characteristics of land use determinants will always reflect, to some degree, the changing conditions of the economic, social, and physical environment of a community as well as changing public concern. The planning process accommodates this fluidity and decisions are not normally based on rigid boundary lines but rather on more generalized area designations.

AICUZ boundaries/noise contours describe the effect of a specific operational environment and, as such, will change if a significant operational change is made. If the local community attempts to use AICUZ boundaries as the boundary lines of zoning districts, it is conceivable that problems will result. Such an attempt to solidify noise contour lines is not consistent with the above characteristics of planning. Additionally, the Air Force is recommending that AICUZ data be utilized with all other planning data. Specific land use control decisions will not, therefore, be based solely on AICUZ boundaries. This amendment attests to the fact that AICUZ boundaries (noise contours) will change. Those changes which substantially modify the contours should be incorporated into the continuing planning process.

EXISTING AND FUTURE CONDITIONS WITHIN THE MATHER AFB AICUZ

Mather AFB is in an area which has the potential to develop with a suburban character. This characteristic presents a problem since one of the more common incompatible land uses near airfields is residential development. The Sacramento County zoning officials and planners are aware of the development problems associated with the AICUZ, and have incorporated appropriate measures into the land use planning/zoning process. This section of the report compares the existing zoning and future land use maps with the AICUZ and relates the existing and future conditions with the AICUZ land use compatibility guidelines.

The existing zoning combined with the AICUZ (Figure IV-3) reveals several incompatible areas of land use in CUDs 2, 6, and 7 to the northeast, south, southwest, and west of the base:

(1) The incompatible areas to the northeast and south are for recreational zoning along canals and creeks and are not considered problem areas for two reasons: (1) The Folsom Canal to the northeast is designated recreational because of its bike trail, but is primarily a waterway, and (2) The areas to the south currently designated recreational are shown as agricultural on the future land use maps, which will remove the existing incompatibility in these areas.

(2) The incompatible area to the southwest is due to existing residential zoning (low density and agricultural residential) in CUDs 6 and 7. This is the most significant area of incompatibility in the AICUZ, and should be of concern both to the community and Mather AFB.

(3) The two incompatible areas west of the base, one low density residential and the other public, although small in size, should also be of concern as a possible indication of urban encroachment in the AICUZ environs.

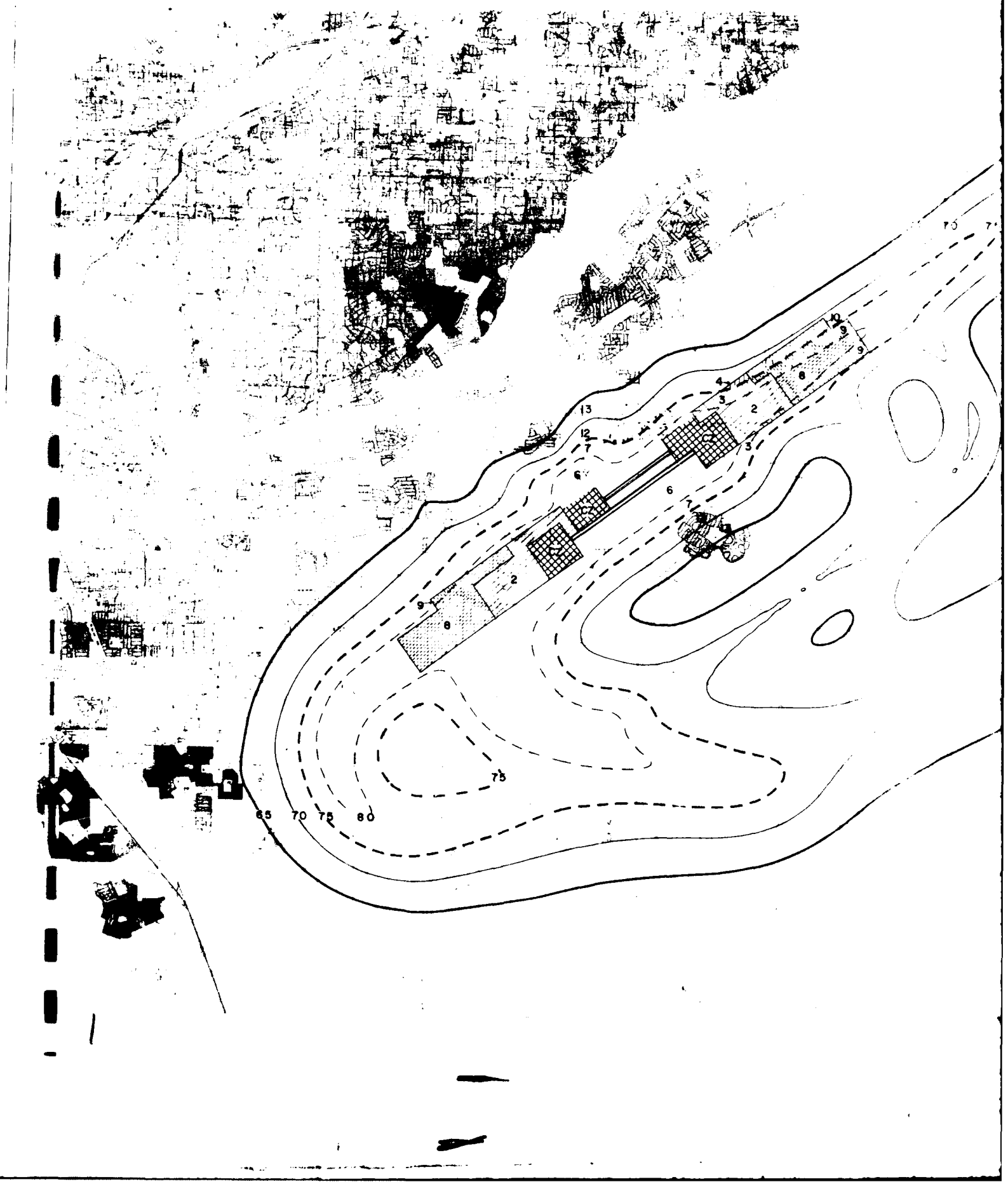
The existing zoning, combined with the AICUZ, also reveals extensive areas of conditionally compatible land use in the CUDs. This conditional compatibility generally refers to the incorporation of noise level reduction in residences, offices, and public reception areas. Additionally, AICUZ policy guidelines discourage residential uses in CUD 13 and strongly discourages residential uses in CUD 12.

The future land use map combined with the AICUZ (Figure IV-4) reveals a situation quite similar to the existing zoning (Figure IV-3) with two exceptions: (1) Incompatible areas for recreational zoning south of the base are deleted due to change to agricultural use, and (2) The incompatible residential zoning to the southwest changes and slightly increases due to changes to low density residential and urban reserve land uses. Conditionally compatible areas for future land use are generally the same as that of the existing zoning.

EXISTING ZONING AND FUTURE LAND USE DATA SOURCE

Land Use Map, General Plan 1973, Sacramento County, updated 29 October 1981. Prepared by the Sacramento County Planning Department.

Land Use Map described above overlaid with Sacramento County Policy Planning Commission Proposed Land Use Revisions, Exhibit "A".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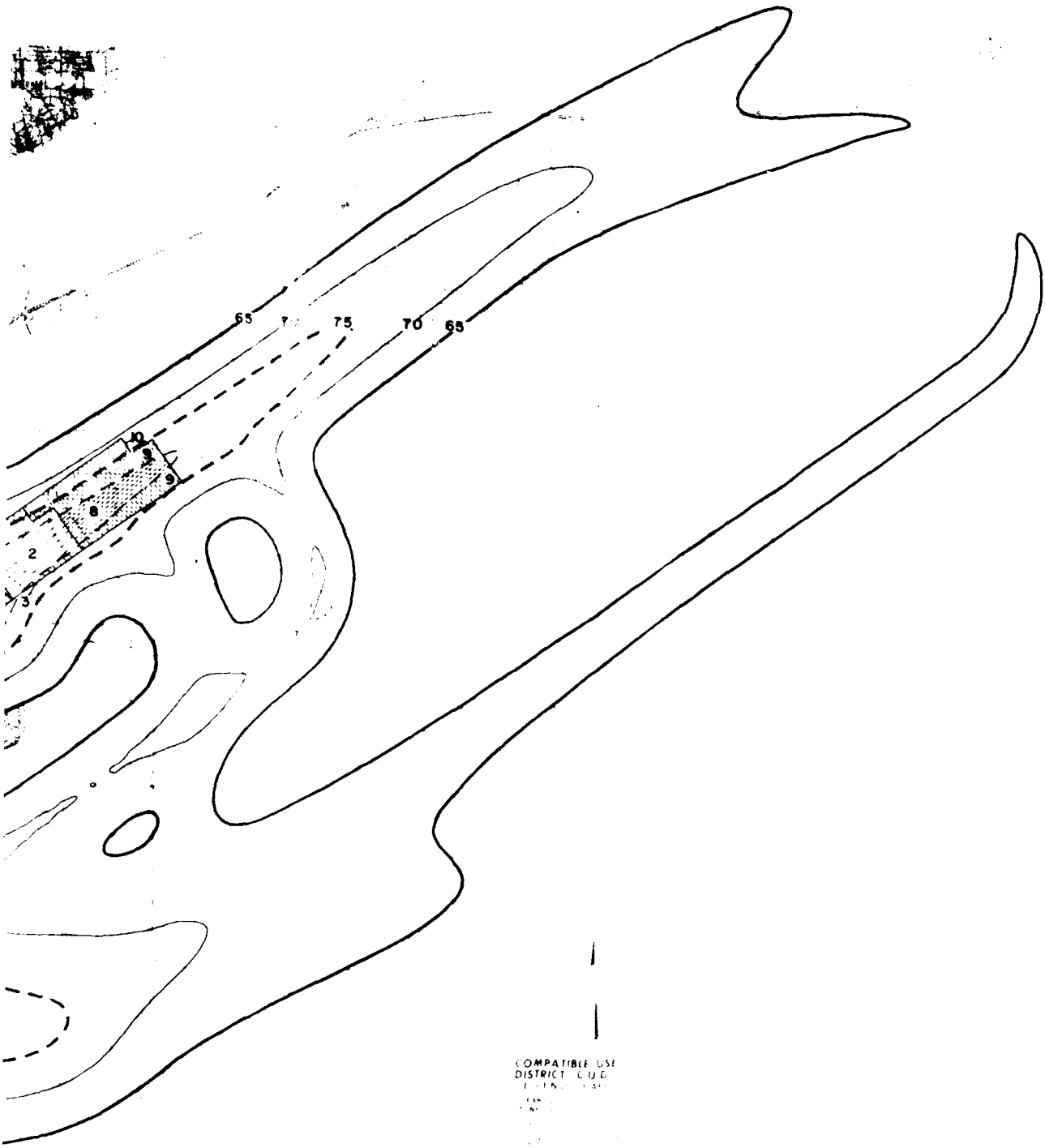

FIG. IV-1 PAGE IV-4

LAND USE COMPATIBILITY GUIDELINES

Extr[redacted] fr[redacted] epa[redacted]nt - Defe[redacted] Inst[redacted]ction .165.[redacted] date[redacted] Nov 6, 197[redacted] Enclosure 4)

SLUCM CODE	LAND USE CATEGORY	COMPATIBLE USE DISTRICTS												
		1	2	3	4	5 *	6	7	8	9	10	11 *	12	13
		L_{dn} 85	APZ I L_{dn} 80-85	APZ I L_{dn} 75-80	APZ I L_{dn} 70-75	APZ I L_{dn} 65-70	L_{dn} 80-85	L_{dn} 75-80	APZ II L_{dn} 80-85	APZ II L_{dn} 75-80	APZ II L_{dn} 70-75	APZ II L_{dn} 65-70	L_{dn} 70-75	L_{dn} 65-70
	RESIDENTIAL													
11x	Single family	N	N	N	N	N	N	N	N	N	30[1,2]	25[1,2]	30[2]	25[2]
11x	Two family	N	N	N	N	N	N	N	N	N	N	N	30[2]	25[2]
11x	Multi-family dwelling	N	N	N	N	N	N	N	N	N	N	N	30[2]	25[2]
12	Group quarters	N	N	N	N	N	N	N	N	N	N	N	30[2]	25[2]
13	Residential hotels	N	N	N	N	N	N	N	N	N	N	N	30[2]	25[2]
14	Mobile home parks or courts	N	N	N	N	N	N	N	N	N	N	N	30[2]	25[2]
15	Transient lodging - hotels, motels	N	N	N	N	N	N	35[2]	N	N	N	N	30[2]	25[2]
19	Other residential	N	N	N	N	N	N	N	N	N	N	N	30[2]	25[2]
	INDUSTRIAL/MANUFACTURING[3]													
21	Food and kindred products	N	N	N	N	N	Y[4]	Y[5]	Y[4]	Y[5]	Y[6]	Y	Y[6]	Y
22	Textile mill products	N	N	N	N	N	Y[4]	Y[5]	N	N	N	N	Y[6]	Y
23	Apparel	N	N	N	N	N	Y[4]	Y[5]	N[4]	N[5]	N[6]	N	Y6	Y
24	Lumber & wood products	N	Y4	Y5	Y6	Y	Y[4]	Y[5]	Y[4]	Y[5]	Y[6]	Y	Y6	Y
25	Furniture & fixtures	N	Y4	Y5	Y6	Y	Y4	Y5	Y4	Y5	Y6	Y	Y6	Y
26	Paper & allied products	N	Y4	Y5	Y6	Y	Y4	Y5	Y4	Y5	Y6	Y	Y6	Y
27	Printing, publishing	N	Y[4]	Y[5]	Y[6]	Y	Y4	Y5	Y4	Y5	Y6	Y	Y6	Y
28	Chemicals & allied products	N	Y3,4	Y3,5	Y3,6	Y[3]	Y4	Y5	Y3,4	Y3,5	Y3,6	Y3	Y[6]	Y
29	Petroleum refining and related industries	N	N	N	N	N	Y[4]	Y[5]	N	N	N	N	Y[6]	Y

This table is a guide. Adaptations to fit local conditions and more precise land use category designations are required based on the criteria of the foregoing narrative.

*Land Use Compatibility for CUDs 5a and 11a is the same as CUDs 5 and 11 except NLR guidelines are not applicable.

Figure IV-2 Land Use Compatibility Guidelines

LAND USE COMPATIBILITY GUIDELINES
(Extract from Department of Defense Instruction 4165.57 dated Nov 8, 1977 Enclosure 4)

SLUCM* CODE	LAND USE CATEGORY	COMPATIBLE USE DISTRICTS												
		1	2	3	4	5 *	6	7	8	9	10	11 *	12	13
		L_{dn} 85	APZ I L_{dn} 80-85	APZ I L_{dn} 75-80	APZ I L_{dn} 70-75	APZ I L_{dn} 65-70	L_{dn} 80-85	L_{dn} 75-80	APZ II L_{dn} 80-85	APZ II L_{dn} 75-80	APZ II L_{dn} 70-75	APZ II L_{dn} 65-70	L_{dn} 70-75	L_{dn} 65-70
	INDUSTRIAL/MANUFACTURING[3]													
31	Rubber & misc plastic	N	Y[4]	Y[5]	Y[6]	Y	Y[4]	Y[5]	Y[4]	Y[5]	Y[6]	Y	Y[6]	Y
32	Stone, clay & glass products	N	Y[4]	Y[5]	Y[6]	Y	Y[4]	Y[5]	Y[4]	Y[5]	Y[6]	Y	Y[6]	Y
33	Primary metal industries	N	Y[4]	Y[5]	Y[6]	Y	Y[4]	Y[5]	Y[4]	Y[5]	Y[6]	Y	Y[6]	Y
34	Fabricated metal products	N	Y[4]	Y[5]	Y[6]	Y	Y[4]	Y[5]	Y[4]	Y[5]	Y[6]	Y	Y[6]	Y
35	Professional, scient fic & controlling instru	N	N	N	N	N	N	30	N	N	N	N	25	Y
39	Misc manufacturing	[illegible]	Y[4]	Y[5]	Y[6]	Y	Y[4]	Y[5]	Y[4]	Y[5]	Y[6]	Y	Y[6]	Y
	TRANSPORTATION, COMMUNICATIONS & UTILITIES[7]													
41	Railroad, rapid rail transit	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
45	Highway & street ROW	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
46	Auto parking	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
47	Communications (noise sensitive)	N	N	30	25	Y	N	30	N	30	25	Y	25	Y
48	Utilities	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
42/43	Other trans, comm, & util	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

This table is a guide. Adaptations to fit local conditions and more precise land use category designations are required based on the criteria of the foregoing narrative.
*Land Use Compatibility for CUDs 5a and 11a is the same as CUDs 5 and 11 except NLR guidelines are not applicable.

Figure IV-2 Land Use Compatibility Guidelines

LAND USE COMPATIBILITY GUIDELINES
(Extract from Department of Defense Instruction 4165.57 dated Nov 8, 1977 Enclosure 4)

SLUCM* CODE	LAND USE CATEGORY	COMPATIBLE USE DISTRICTS												
		1	2	3	4	5 *	6	7	8	9	10	11 *	12	13
		L_{dn} 85	APZ I L_{dn} 80-85	APZ I L_{dn} 75-80	APZ I L_{dn} 70-75	APZ I L_{dn} 65-70	L_{dn} 80-85	L_{dn} 75-80	APZ II L_{dn} 80-85	APZ II L_{dn} 75-80	APZ II L_{dn} 70-75	APZ II L_{dn} 65-70	L_{dn} 70-75	L_{dn} 65-70
	COMMERCIAL/RETAIL TRADE													
51	Wholesale trade	N	Y[4]	Y[5]	Y[6]	Y	Y[4]	Y[5]	Y[4]	Y[5]	Y[6]	Y	Y[6]	Y
52	Building materials-retail	N	Y[4]	Y[5]	Y[6]	Y	Y[4]	Y[5]	Y[4]	Y[5]	Y[6]	Y	Y[6]	Y
53	General merchandise-retail	N	N	N	N	N	N	30	N	30	25	Y	25	Y
54	Food-retail	N	N	N	N	N	N	30	N	30	25	Y	25	Y
55	Automotive, marine	N	N	30	25	Y	N	30	N	30	25	Y	25	Y
56	Apparel & accessories - retail	N	N	N	N	N	N	30	N	30	25	Y	25	Y
57	Eating & drinking places	N	N	N	N	N	N	30	N	N	N	N	25	Y
58	Furniture, home furnishing retail	N	N	30	25	Y	N	30	N	30	25	Y	25	Y
59	Other retail trade	N	N	N	N	N	N	30	N	30	25	Y	25	Y
	PERSONAL & BUSINESS[8] SERVICES													
61	Finance, insurance &[8] real estate	N	N	N	N	N	N	30	N	30	25	Y	25	Y
62	Personal services	N	N	N	N	N	N	30	N	30	25	Y[1]	25	Y
63	Business services	N	N	N	N	N	N	30	N	30	25	Y	25	Y
64	Repair services	N	Y[4]	Y[5]	Y[6]	Y	Y[4]	Y[5]	Y[4]	Y[5]	Y[6]	Y	Y[6]	Y
66	Contract construction services	N	N	N	N	N	N	30	N	30	25	Y	25	Y

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*Land Use Compatibility for CUDs 5a and 11a is the same as CUDs 5 and 11 except NLR guidelines are not applicable.

Figure IV-2 Land Use Compatibility Guidelines

LAND USE COMPATIBILITY GUIDELINES
(Extract from Department of Defense Instruction 4165.57 dated Nov 8, 1977 Enclosure 4)

SLUCM CODE	LAND USE CATEGORY	COMPATIBLE USE DISTRICTS												
		1	2	3	4	5 *	6	7	8	9	10	11 *	12	13
		L_{dn} 85	APZ I L_{dn} 80-85	APZ I L_{dn} 75-80	APZ I L_{dn} 70-75	APZ I L_{dn} 65-70	L_{dn} 80-85	L_{dn} 75-80	APZ II L_{dn} 80-85	APZ II L_{dn} 75-80	APZ II L_{dn} 70-75	APZ II L_{dn} 65-70	L_{dn} 70-75	L_{dn} 65-70
	PERSONAL & BUSINESS[8] SERVICES (cont)													
	Indoor recreation services	N	N	N	N	N	N	30	N	30	25	Y	25	Y
69	Other services	N	N	N	N	N	N	30	N	30	25	Y	25	Y
	PUBLIC & QUASI PUBLIC SERVICES													
67	Government services	N	N	N	N	N	N	30	N	30[8]	25[8]	Y[8]	25	Y
68	Educational services	N	N	N	N	N	N	N	N	N	N	N	30	25
711	Cultural activities incl churches	N	N	N	N	N	N	N	N	N	N	N	30	25
651	Medical & other health services[9]	N	N	N	N	N	N	N	N	N	N	N	30	25
624	Cemeteries	Y	Y4,10	Y5,10	Y6,10	Y10	Y4	Y5	Y4,10	Y5,10	Y6,10	Y10	Y6	Y
69x	Non profit organization	N	N	N	N	N	N	N	N	N	N	N	30	25
	Other public and quasi-public services	N	N	N	N	N	N	N	N	N	30	25	30	25
	OUTDOOR RECREATION													
761x	Playgrounds, neighborhood parks	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y
762x	Community & regional	N	N	N	Y11	Y11	N	N	N	N	Y	Y11	Y11	Y

This table is a guide. Adaptations to fit local conditions and more precise land use category designations are required based on the criteria of the foregoing narrative.

*Land Use Compatibility for CUDs 5a and 11a is the same as CUDs 5 and 11 except NLR guidelines are not applicable.

Figure IV-2 Land Use Compatibility Guidelines

LAND USE COMPATIBILITY GUIDELINES
(Extract from Department of Defense Instruction 4165.57 dated Nov 8, 1977 Enclosure 4)

SLUCM* CODE	LAND USE CATEGORY	COMPATIBLE USE DISTRICTS												
		1	2	3	4	5 *	6	7	8	9	10	11 *	12	13
		L_{dn} 85	APZ I L_{dn} 80-85	APZ I L_{dn} 75-80	APZ I L_{dn} 70-75	APZ I L_{dn} 65-70	L_{dn} 80-85	L_{dn} 75-80	APZ II L_{dn} 80-85	APZ II L_{dn} 75-80	APZ II L_{dn} 70-75	APZ II L_{dn} 65-70	L_{dn} 70-75	L_{dn} 65-70
	OUTDOOR RECREATION (cont)													
712	Nature exhibits	N	N	N	N	Y	N	N	N	N	N	Y	N	Y
722	Spectator sports incl arenas	N	N	N	N	N	N	N	N	N	N	N	N	Y
741x	Golf course[12], riding stables[13]	N	N	Y[14]	Y[15]	Y	N	Y[14]	N	Y[14]	Y[15]	Y	Y[15]	Y
743/ 744	Water based recreational areas	N	N	Y[14]	Y[15]	Y	N	Y[14]	N	Y[14]	Y[15]	Y	Y[15]	Y
75	Resort & group camps	N	N	N	N	N	N	N	N	N	N	N	Y	Y
721x	Auditoriums, concert halls	N	N	N	N	N	N	N	N	N	N	N	N	Y
721x	Outdoor amphitheaters, music shells	N	N	N	N	N	N	N	N	N	N	N	N	N
	Other outdoor recreation	N	N	N	Y[11]	Y[11]	N	N	N	N	Y	Y	Y	Y
	RESOURCE PRODUCTION, EXTRACTION, & OPEN SPACE													
81	Agriculture (except live-stock)	Y[17]	Y[17]	Y[17]	Y[18]	Y[19]	Y[17]	Y[17]	Y[17]	Y[17]	Y[18]	Y[19]	Y[18]	Y[19]
815/ 817	Livestock farming, animal breeding	N	N	Y[17]	Y[18]	Y[19]	N	Y[17]	N	Y[17]	Y[18]	Y[19]	Y[18]	Y[19]
83	Forestry activities	Y[17]	Y[17]	Y[17]	Y[18]	Y[19]	Y[17]	Y[17]	Y[17]	Y[17]	Y[18]	Y[19]	Y[18]	Y[19]

This table is a guide. Adaptations to fit local conditions and more precise land use category designations are required based on the criteria of the foregoing narrative.

*Land Use Compatibility for CUDs 5a and 11a is the same as CUDs 5 and 11 except NLR guidelines are not applicable.

Figure IV-2 Land Use Compatibility Guidelines

LAND USE COMPATIBILITY GUIDELINES
(Extract from Department of Defense Instruction 4165.57 dated Nov 8, 1977 Enclosure 4)

SLUCM* CODE	LAND USE CATEGORY	COMPATIBLE USE DISTRICTS												
		1	2	3	4	5 *	6	7	8	9	10	11 *	12	13
		L_{dn} 85	APZ I L_{dn} 80-85	APZ I L_{dn} 75-80	APZ I L_{dn} 70-75	APZ I L_{dn} 65-70	L_{dn} 80-85	L_{dn} 75-80	APZ II L_{dn} 80-85	APZ II L_{dn} 75-80	APZ II L_{dn} 70-75	APZ II L_{dn} 65-70	L_{dn} 70-75	L_{dn} 65-70
	RESOURCE PRODUCTION, EXTRACTION & OPEN SPACE (cont)													
84	Fishing activities & related services	Y	Y[11]	Y[11]	Y[11]	Y[11]	Y	Y	Y	Y	Y	Y	Y	Y
85	Mining activities	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
91	Permanent open space	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
93	Water areas	Y	Y[11]	Y[11]	Y[11]	Y[11]	Y	Y	Y[11]	Y[11]	Y[11]	Y[11]	Y	Y

This table is a guide. Adaptations to fit local conditions and more precise land use category designations are required based on the criteria of the foregoing narrative.

*Land Use Compatibility for CUDs 8a and 11a is the same as CUDs 8 and 11 except NLR guidelines are not applicable.

Figure IV-2 Land Use Compatibility Guidelines

LAND USE COMPATIBILITY GUIDELINES
(Extract from Department of Defense Instruction 4165.57 dated Nov 8, 1977 Enclosure 4)

NOTES

N (NO) - The land use and related structures are not compatible and should be prohibited.

Y (YES) - The land use and related structures are compatible without restriction and should be considered.

Y^X (YES WITH RESTRICTIONS)
- The land use and related structures are generally compatible; however, some special factors should be considered.

35, 30 or 25
- The land use is generally compatible; however, a Noise Level Reduction (NLR) of 35, 30 or 25 must be incorporated into the design and construction of the structure.

35^X, 30^X or 25^X
- The land use is generally compatible with NLR; however, such NLR does not necessarily solve noise difficulties and additional evaluation is warranted.

1 - Because of the accident hazard potential, the residential density in these CUDs should be limited to the maximum extent possible. It is recommended that residential density not exceed one dwelling unit per acre. Such use should be permitted only following a demonstration of need to utilize this area for residential purposes.

2 - Although it is recognized that local conditions may require residential uses in these CUDs, this use is strongly discouraged in CUDs 10 and 12, and discouraged in CUDs 11 and 13. The absence of viable alternative development options should be determined and an evaluation indicating that a demonstrated community need for residential use would not be met if development were prohibited in these CUDs should be conducted prior to approvals.

Where the community determines that residential uses must be allowed Noise Level Reductions of at least 30 (CUDs 10 and 12) and 25 (CUDs 11 and 13) should be incorporated into building codes and/or individual approvals. Additional consideration should be given to modify the NLR levels based on peak noise levels. Such criteria will not eliminate outdoor environment noise problems and, as a result, site planning and design should include measures to minimize this impact, particularly where the noise is from ground level sources.

Figure IV-2 Land Use Compatibility Guidelines

LAND USE COMPATIBILITY GUIDELINES
(Extract from Department of Defense Instruction 4165.57 dated Nov 8, 1977 Enclosure 4)

3 - Because these uses vary considerably by locality and within a general category, particular care should be taken to evaluate and modify guidelines to fit local conditions. Among factors to be considered: labor intensity, structural coverage explosive inflammable characteristics, size of establishment, people density, peak period (including shopper/ visitors) concentrations.

4 - An NLR of 35 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas or where the normal noise level is low.

5 - An NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas or where the normal noise level is low.

6 - An NLR of 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas or where the normal noise level is low.

7 - No structures in Clear Zone, no passenger terminals, and no major ground transmission lines in Clear Zones or APZ I.

8 - Low intensity office uses only (limited scale of concentration of such uses). Meeting places, auditoriums, etc not recommended.

9 - Excludes hospitals.

10 - Excludes chapels.

11 - Facilities must be low intensity.

12 - Clubhouse not recommended.

13 - Concentrated rings with large classes not recommended.

14 - An NLR of 30 must be incorporated into buildings for this use.

15 - An NLR of 25 must be incorporated into buildings for this use.

Figure IV-2 Land Use Compatibility Guidelines

LAND USE COMPATIBILITY GUIDELINES
(Extract from Department of Defense Instruction 4165.57 dated Nov 8, 1977 Enclosure 4)

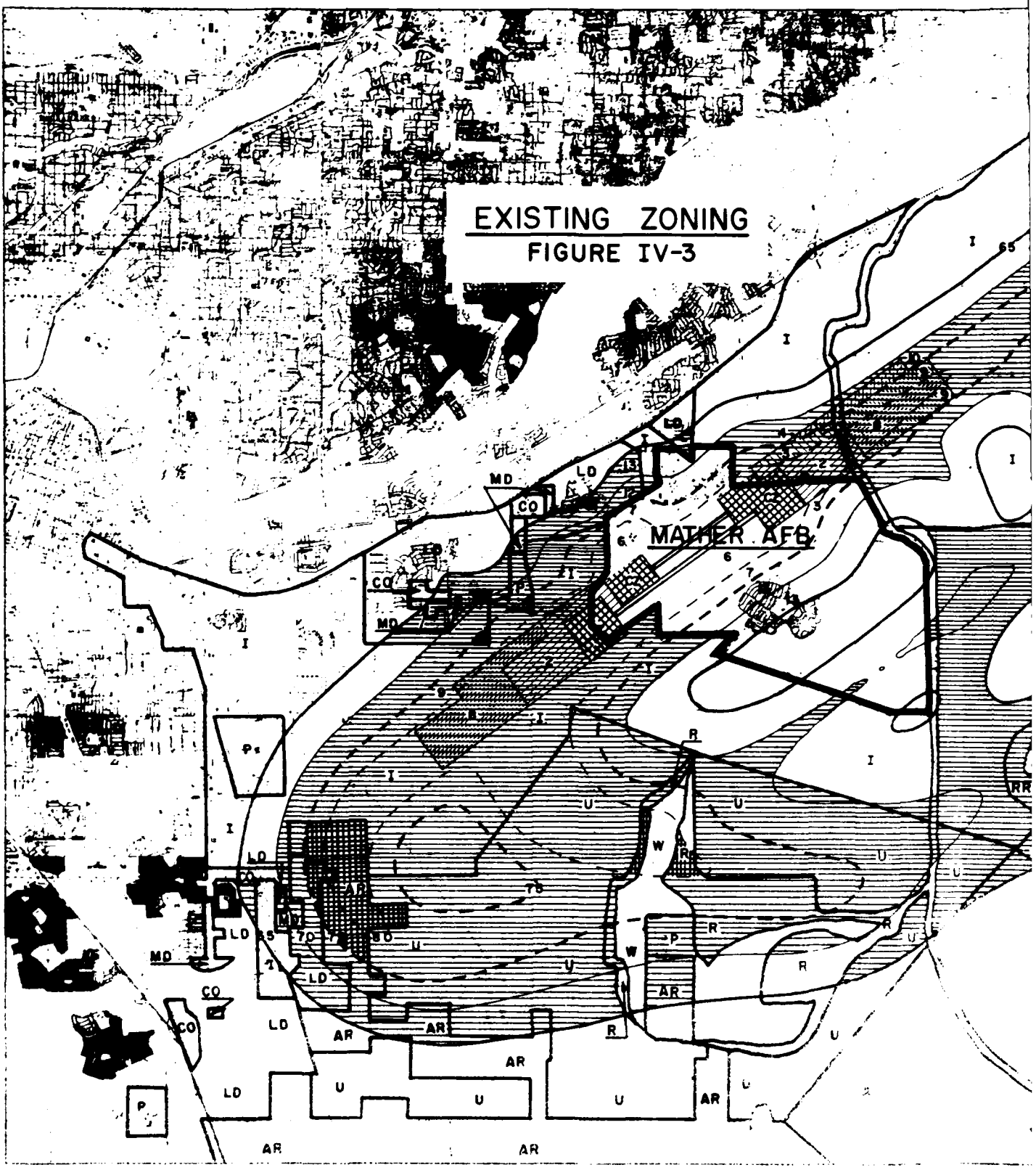
16 - No structures in Clear Zone.

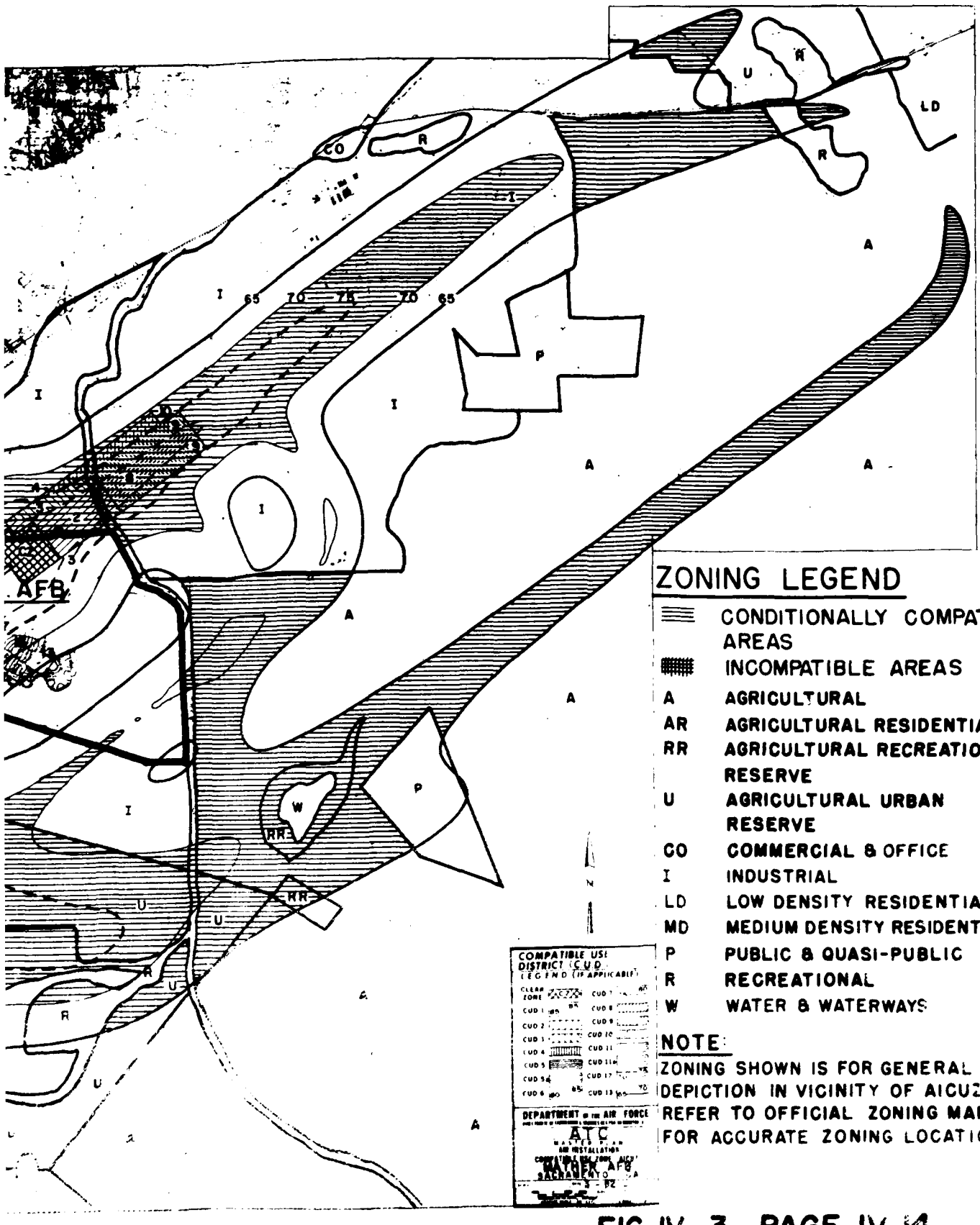
17 - Residential structures not permitted.

18 - Residential buildings require an NLR of 30.

19 - Residential buildings require an NLR of 25.

Figure IV-2 Land Use Compatibility Guidelines


EXISTING ZONING
FIGURE IV-3
MATHER AFB
MD
CO
LD
AR
U
R
I
W
P
Ps
RR



ZONING LEGEND

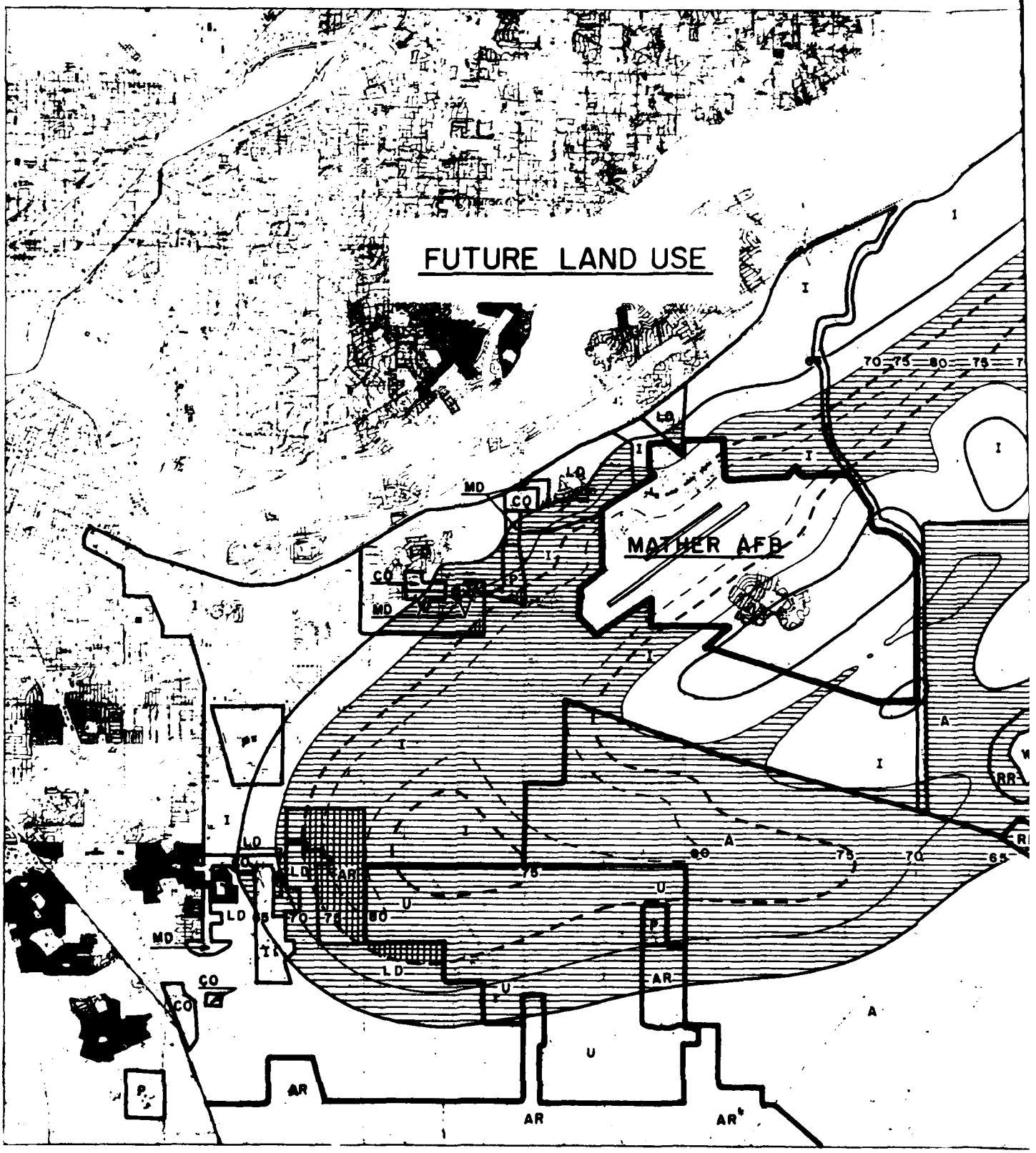
≡	CONDITIONALLY COMPATIBLE AREAS
▦	INCOMPATIBLE AREAS
A	AGRICULTURAL
AR	AGRICULTURAL RESIDENTIAL
RR	AGRICULTURAL RECREATIONAL RESERVE
U	AGRICULTURAL URBAN RESERVE
CO	COMMERCIAL & OFFICE
I	INDUSTRIAL
LD	LOW DENSITY RESIDENTIAL
MD	MEDIUM DENSITY RESIDENTIAL
P	PUBLIC & QUASI-PUBLIC
R	RECREATIONAL
W	WATER & WATERWAYS

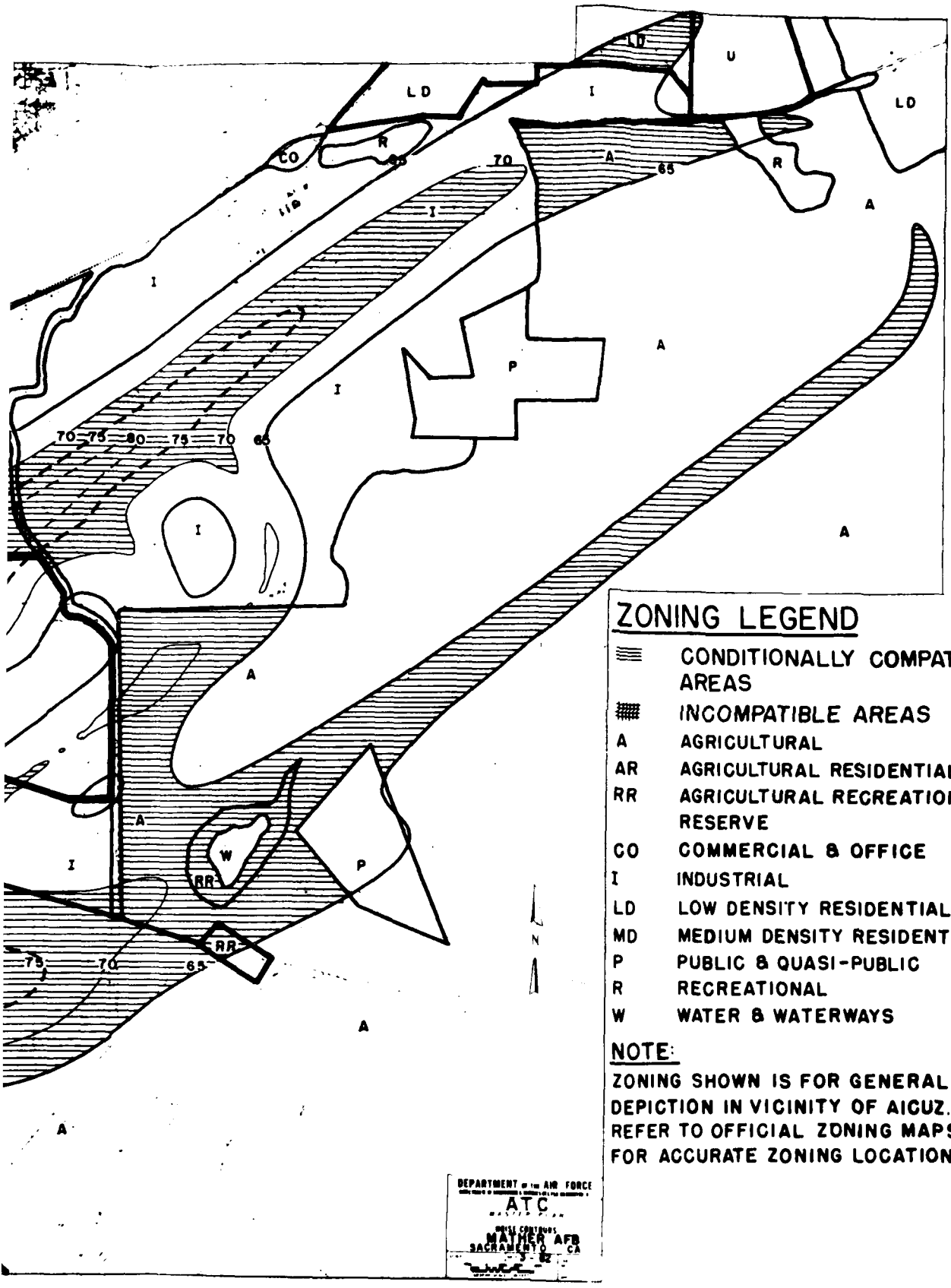
NOTE:

ZONING SHOWN IS FOR GENERAL DEPICTION IN VICINITY OF AICUZ REFER TO OFFICIAL ZONING MAPS FOR ACCURATE ZONING LOCATION

FIG. IV-3 PAGE IV-14

2


FUTURE LAND USE
MATHER AFB
MD
CO
LD
I
A
U
AR
70
75
80
65



ZONING LEGEND

≡	CONDITIONALLY COMPATIBLE AREAS
▦	INCOMPATIBLE AREAS
A	AGRICULTURAL
AR	AGRICULTURAL RESIDENTIAL
RR	AGRICULTURAL RECREATIONAL RESERVE
CO	COMMERCIAL & OFFICE
I	INDUSTRIAL
LD	LOW DENSITY RESIDENTIAL
MD	MEDIUM DENSITY RESIDENTIAL
P	PUBLIC & QUASI-PUBLIC
R	RECREATIONAL
W	WATER & WATERWAYS

NOTE:

ZONING SHOWN IS FOR GENERAL DEPICTION IN VICINITY OF AICUZ. REFER TO OFFICIAL ZONING MAPS FOR ACCURATE ZONING LOCATION.

FIG. IV-4 PAGE IV-15

V. AIR FORCE RESPONSIBILITIES

GENERAL

While Air Force responsibilities toward the community are numerous and diverse, those concerning aircraft noise and accident potential pose unique problems. To be realistic, neither can be completely eliminated as long as aircraft are flying. Self-imposed control of aircraft operations can minimize the effects of noise and accident potential, particularly in conjunction with a cooperative planning effort by the surrounding community. This joint effort can effectively reduce the problems resulting from land uses which are inherently incompatible with aircraft operations. In general, the Air Force perceives its AICUZ responsibilities as falling within the areas of flying safety, noise abatement, and participation in the land use planning process.

FLYING SAFETY

Throughout the world, the Air Force conducts an extremely comprehensive flying safety program. Every aspect of flying and aircraft maintenance is governed by safety considerations to avoid the loss of life and property. Every precaution is taken to ensure the airworthiness of each aircraft, the flying proficiency of the aircrews, and safe airborne operations.

Well-maintained aircraft and well-trained aircrews do much to assure that aircraft accidents are avoided. However, despite the best training of aircrews and maintenance of aircraft, history makes it clear that accidents do occur. It is imperative that flights be routed over sparsely populated areas as much as possible to reduce the exposure of lives and property to a potential accident. As civilian flight operations increase, and airspace becomes more limited, the current flight tracks for aircraft arriving and departing Mather AFB become less flexible. It has become increasingly difficult, and impossible in some cases, to change aircraft routing or altitudes to entirely avoid community growth. Thus, the need for controlled community planning becomes readily apparent.

NOISE ABATEMENT

Noise is generated from aircraft both in the air and on the ground. At Mather AFB, operations are evaluated continuously to maintain noise levels at a minimum, both on and off base, in areas such as those developed for housing and education. Some of the actions which have been implemented, plus other flying and maintenance rules in effect, are examples of the noise awareness which prevails at Mather AFB.

Practice takeoffs/landings and instrument approaches are conducted at times when individuals are normally awake. These activities are not scheduled between 10:00 p.m. and 6:00 a.m. During this time only mission essential aircraft arrivals and departures are conducted.

Whenever possible, traffic patterns are located away from the population centers both on and off base. Base maintenance run-up activities are not performed after 10:00 p.m., nor before 6:00 a.m. except for high-priority mission requirements.

PARTICIPATION IN THE PLANNING PROCESS

The Air Force will continue to evaluate operations at Mather AFB in an effort to minimize the environmental effects upon the surrounding area. In keeping with this policy and with the intent of Federal legislation concerning the environment, the base will assess the impact of any proposed actions where there may be environmental consequences. As an extension of this process, the base will continue to assist in local planning processes that support environmental protection efforts.

The AICUZ program is intended to be an on-going process. In recognition of this fact, the Base Civil Engineer is prepared to participate in the continuing discussion of zoning and other land use matters as they may affect, or may be affected by, Mather AFB.

VI. COMMUNITY RESPONSIBILITIES

The implementation of the AICUZ study should be a joint effort between the Air Force and adjacent communities. The Air Force role is to minimize the impact of its operations on local communities as explained in Chapter V. The role of communities is to insure that development within the AICUZ environs is compatible with sound planning principles and practices.

Cities and counties affected by the Mather AFB AICUZ should review their zoning ordinances, height controls, subdivision regulations, building codes, and general plans for compatibility with AICUZ guidelines. Capitol Improvement Programs should also be reviewed and modified, if necessary, to promote compatible land use patterns.

Special attention should be given to areas identified as incompatible or conditionally compatible on Figures IV-3 and IV-4. When economically or otherwise feasible, incompatible areas should be rezoned to compatible uses or restricted from future incompatible development. AICUZ noise level reduction guidelines should be applied to all conditionally compatible areas to ensure compatibility of development and aircraft operations.

The final determination of land use in the Mather AICUZ environs is the responsibility of local Government. Land use decision should carefully consider the health and welfare of the public, flying safety, the contribution of the flying mission to national defense, and the overall economic and social interrelationship of Mather AFB and the local communities.

APPENDIX A

MATHER AIR FORCE BASE MISSION

The 323d Flying Training Wing at Mather AFB, California, has the responsibility for training all navigators for the various Department of Defense flying operations. The Wing, four times the winner of the Air Force Outstanding Unit Award, provides navigation training for Air Force, Air Force Reserve, Air National Guard, and U.S. Navy officers, and for selected U.S. Marine Corps enlisted personnel. Additionally, the Wing provides training for air force officers from a number of friendly foreign countries.

In addition to the basic Undergraduate Navigator Training course, the Wing conducts four graduate courses: Advanced Navigation, Tactical Navigation, Navigator-Bombardier Training, Electronic Warfare Officer Training and short-term related specialized programs. Air Force officers are prepared for duty in aircraft that perform airlift, reconnaissance, air refueling, rescue, fighter or electronic countermeasure missions. Other U.S. and foreign personnel are trained for a variety of missions to meet the specific needs of their organizations. To carry out its mission, the 323d Flying Training Wing operates a fleet of T-37 and T-43 aircraft and an array of sophisticated equipment such as the T45 navigation simulator and the T5 simulator for electronic warfare which were procured in a large modernization program in the early 1970's.

The proximity of the Pacific Ocean to Mather AFB makes possible extensive overwater flying, while the many and varied types of terrain along the numerous assigned flying training routes fanning out from Mather provide students the opportunity to navigate over almost any conceivable type of land mass. Along these routes, most of the weather conditions of the world can be experienced.

The importance of this training mission to the national defense posture cannot be overemphasized. The Air Force's capability for successful tactical and strategic operations and for global airlift depends largely on the expertise of its navigators. Except for single-place fighters, there are few aircraft in the Air Force today that do not carry Mather-trained navigators as crew members.

Mather AFB also provides support to the following units:

320th Bombardment Wing (Heavy). The mission of the award-winning 320th Bombardment Wing is to maintain long-range bombardment capability with their B-52G aircraft, and to sustain the capability for worldwide air refueling operations with their KC-135 aircraft. The wing is part of the Strategic Air Command.

The B-52's and KC-135's have been modified repeatedly to keep them abreast of technological advancements. Modifications to the B-52G include a Satellite Communications System for worldwide communication via satellite, an electro-optical viewing system, and addition of sophisticated electronic countermeasure packages for aircraft defense. All of the 320th's bombers also have been modified to carry the short range attack missile (SRAM) which greatly extends the aircraft's weapons delivery capabilities.

The 320th Bombardment Wing saw extensive action in Southeast Asia beginning with its first deployment in 1965 as the first B-52 unit to fly strike missions over Vietnam. In recognition of its achievements during the conflict, the 320th received two Air Force Outstanding Unit Awards.

940th Air Refueling Group. The 940th Air Refueling Group is an Air Force Reserve (AFRES) unit which is part of the 452d Air Refueling Wing, March AFB, California. The 940th Air Refueling Group moved to Mather from McClellan AFB, Sacramento, on 1 January 1977 and flies and maintains eight KC-135 air refueling tankers. The wing is under the direction of Tenth Air Force (Reserve), Bergstrom AFB, Texas and Headquarters, AFRES, Robins AFB, Georgia. In the event of mobilization, the unit is gained by the Strategic Air Command.

The mission of the 940th is to organize, equip, and train aircrews to refuel airborne aircraft worldwide, and to support the Joint Chiefs of Staff Single Integrated Operations Plan Daily Alert with combat ready KC-135 aircraft and crews. The wartime mission of the 940th is to perform such missions as directed by the Commander-in-Chief, Strategic Air Command.

In addition to their alert commitment, the 940th's crews, aircraft and support personnel provide regular air refueling to USAF, National Guard, Reserve, Navy and Marine aircraft.

Detachment 7, 24th Weather Squadron (MAC). Det 7, 24WS provides meteorological support to all units assigned to Mather AFB and transient aircrews. Weather at Mather AFB during the winter months is characterized by fog, low stratus, and gusty surface winds. During the summer, high temperatures and occasional thunderstorms over nearby mountains, are characteristic of local meteorological conditions. Professional meteorologists assigned to Det 7 provide accurate forecasts and observations to support the flying missions of the 323 FTW(ATC), 323 BMW (SAC), 940 AREFG (AFRES), and the Sacramento Army Aviation Support Facility (CANG). They also provide weather support to all ground based units in support of their mission and to protect personnel, property and other resources located at Mather AFB.

2034th Communications Squadron (AFCC). The Squadron provides Mather AFB and its tenants with communications and air traffic control services, including operation and/or maintenance support for a communications center, base telephone system, weather communications equipment, specialized SAC communications and intrusion systems, closed circuit television, control tower, navigational aids, and radio systems.

3506th USAF Recruiting Group (ATC). The 3506th is responsible for recruiting Air Force personnel into enlisted and officer programs from 13 western states, including Alaska, Hawaii, the Far East, plus the western tip of Texas, Kansas, and Nebraska. During FY 81, the 3506th enlisted more than 16,000 non-prior service, 900 prior service, more than 500 officers, and over 200 officers into the health professions field.

Detachment 515, 3751st Field Training Squadron (ATC). Detachment 515 is responsible for on-site aircraft maintenance training and on-the-job advisory service and training at Mather AFB. The detachment trains Air Force and civilian personnel in the aircrew and maintenance support areas on the T-37, T-43, B-52, and KC-135 aircraft.

Air Force Office of Special Investigation (AFOSI) Detachment 1904. Detachment 1904 is a detachment of AFOSI District 19, Travis AFB, CA. Upon request, AFOSI provides professional investigative services to commanders of all Air Force activities under the criminal, fraud, and counterintelligence areas. AFOSI and its various directorates function as a fact-finding agency for requesting authorities.

Detachment 3, 3314 Management Engineering Squadron (MES) (ATC). Detachment 3 is a field extension of the Directorate of Manpower and Organization, HQ ATC. The primary mission is to provide manpower and organization services to local ATC units, support HQ ATC manpower programs, perform management consultant and productivity enhancement studies, and participate in the Air Force and command management engineering programs.

Detachment 448, Air Force Audit Agency. The mission of the detachment is to provide base officials with an independent, objective, and constructive evaluation of the effectiveness and efficiency with which managerial responsibilities (including financial, operations, and support activities) are carried out.

USAF Civil Air Patrol (CAP) Pacific Liaison Region (ATC). The Liaison Region supervises Liaison Offices in California, Nevada, Oregon, Washington, Alaska, and Hawaii; advises and assists the CAP Region Commander in the management of resources and development of training programs; performs staff supervisory evaluations, conducts search and rescue, and disaster relief evaluations in the above six states; monitors and coordinates education activities to include presentations of new curriculum and new events in aerospace to the CAP and civilian educators; represents the Commander, CAP-USAF as implementing agent for policies, directives, and procedures established by HQ CAP - USAF; advises CAP Unit Commanders on organization, administration, and matters of a technical nature; and provides liaison and control between CAP and Federal Government sources where facilities, services, equipment, or funds are involved.

Sacramento Army Aviation Support Facility (AASF-SAC). The facility provides centralized control and assures proper maintenance, use, and operation of aviation assets assigned to Northern California which are based at Mather AFB. Fifty-six administrative and maintenance technicians are authorized on a full-time basis to accomplish this mission. Seventy aviators and sixty enlisted crew members are supported by the facility for aviation activities and related training requirements.

USAF Judiciary Area Defense Counsel (ADC). The ADC performs as defense counsel in courts-martial proceedings, Article 32 investigations, administrative separation actions, and interrogation situations. ADC also provides Article 15 advice and representation, to the extent available, in personal hearings before Commanders.

Federal Aviation Administration-Radar (FAA). The Airway Facilities Sector Field Office at Mather AFB processes and remotes to the Oakland Air Traffic Control Center (ARTCC) radar/beacon data used in controlling Northern California and Western Nevada. The Long-Range Radar facility consists of long-range radar, beacon, air-ground communications, and data processing equipment which is used by Oakland Center in controlling air traffic.

Commissary (OL OG, AFCOMS). This activity is responsibility for requisitioning, receiving, storing, issuing and selling authorized subsistence items to food service dining halls and commissary patrons.

APPENDIX B

ECONOMIC IMPACT STUDY

Mather AFB is big business in the Sacramento area. If the base was lost to the local economy, it would take away an investment in excess of $600 million, annual payrolls exceeding $121 million and procurement expenditures of more than $14 million, most of which is spent in the Sacramento area and Northern California.

Assigned military and civilian personnel and their families represent a population of over 20,000 which contribute to the economic and community life in the greater Sacramento area. In addition, the Sacramento area has the second largest concentration of military retirees in the United States. An estimated 70,000 retired military members and their dependents reside in the Sacramento area and contribute to the base/community relationship. Active duty personnel and retirees rely on Mather AFB for medical services, commissary and Base Exchange (BX) privileges. No other military installation in the area has facilities which would be adequate to serve even a small fraction of these people. No statistics are available to tell how many of these retirees would move out of the area should these services no longer be provided. However, the number would be significant.

Mather AFB has approximately 4,900 military personnel assigned, 2,650 of which live with their families off base. The 2,650 off base members, and their 7,000 dependents bring the total to approximately 10,000 persons residing in the Rancho Cordova/Sacramento area. All of these people either rent from local landlords or own homes.

The annual military payroll at Mather AFB is over $88 million. Although part of this payroll is spent at the BX and the commissary, many items (automobiles, large appliances, television sets, jewelry, etc.) must be purchased from the local economy. In addition, military families who reside off base buy most of their convenience items from nearby stores.

The base provides over 2,000 jobs for civilians, with an annual payroll of more than $33 million. Since most of these employees do not have commissary and BX privileges, the majority of their income is spent in the local economy.

Approximately $16 million has been spent on major construction of permanent facilities at Mather AFB within the last 5 years. In the past three years, over $12½ million has gone into smaller construction projects and for the maintenance and upgrading of existing facilities.

Mather's procurement expenditures in the Sacramento area amounted to more than $9.0 million in fiscal year 1981 for supplies, office equipment, medical supplies and equipment, food and food services, utilities, contracts, and so forth. The total procurement figure for fiscal year 1981 was more than $14 million.

The majority of the Rancho Cordova community falls within the jurisdiction of the Folsom-Cordova Unified School District. Throughout the Sacramento school districts (Folsom-Cordova, Elk Grove, San Juan, Grant, and Sacramento City Unified), there are over 1,500 students whose parents are either military or civilians assigned to Mather AFB. Federal aid to the school districts directly attributable to these students exceeded $1.1 million during the 1980/81 school year.

In summary, Mather AFB has a tremendous economic impact on the Sacramento area. Every week, approximately $2.3 million is spent in the community for food, homes, autos, clothing, entertainment, and services of every kind. The money moves through the community creating other jobs and ad infinitum. Should this source of economic support be eliminated or reduced, it would cause severe problems for Rancho Cordova and the entire County of Sacramento.

Employee Annual Salaries - Dollar Impact of Payrolls (FY 1981)

Military	$ 88,421,007
Civil Service	27,622,422
Nonappropriated Fund & Base Exchange	4,820,343
Other Civilian Employees	1,125,000 (est)
Total Payroll	$121,988,772

Number of Personnel Assigned (30 Sep 81)

Military	
Permanent Party (ATC)	2,250
Navigator Students	968
320th Bombardment Wing (SAC)	1,420
Other Tenant Units	229
Total Military	4,867
Civilian	
Civil Service/Wage Board	1,233
Nonappropriated Fund	91
Contractor Employees	255
Other (BX, FAA, Boeing, etc.)	545
Total Civilians	2,124
Total Mather Personnel Assigned	6,991

Mather AFB's civilian work force includes 22.8% minority group personnel among the 1,233 civil service employees. This compares favorably with the Civil Service Commission estimate of 16.5% of the Sacramento County population.

Mather AFB Capital Assets (30 Sep 81)

Appropriated Fund Inventories	$ 20,142,339
Equipment in Use	78,901,991
Real Property	133,104,712
*Aircraft	1,000,394,093
Other	5,323,484
Total	$ 1,237,866,619

*Constant FY 81 Dollars

SOURCE: 323 FTW/ACM, Mather AFB, CA

323 CES/DEV, Mather AFB, CA

APPENDIX C

ACCIDENT POTENTIAL STUDY

One of the most important milestones of accident hazard analysis took place in 1952 with the publication of The Airport and Its Neighbors. This report of the President's Airport Commission, better known as the Doolittle Report, has several significant recommendations on the subject of airport hazards:

"4. Incorporate cleared runway extension areas into airports. The dominant runways of new airport projects should be protected by cleared extensions at each end of at least one-half mile in length and 1000 feet wide. This area should be completely free from housing or any other form of obstruction. Such extensions should be considered an integral part of the airport."

"5. Establish effective zoning laws. A fan-shaped zone, beyond the half-mile cleared extension described in recommendation 4, at least two (2) miles long and 6000 feet wide at its outer limits, should be established at new airports by zoning law, air easement or land purchase at each end of dominant runways. In this area, the height of buildings and also the use of land should be contolled to eliminate the erection of places of public assembly, churches, hospitals, schools, etc., and to restrict residences to the more distant locations within the zone."

These recommendations were based on the knowledge that accident risk was greater in these areas than others. It was an attempt to define a relative, acceptable risk. The Doolittle Report criteria served as the general basis for the original Air Force Greenbelt and AICUZ concepts of 1971 and 1972, although the lines were somewhat different from those of FAA and Air Force criteria. Fan-shaped approach-departure zones were used to a point 2 1/2 miles from the threshold and divided into two parts. The first 2500 feet was Zone 1 and the remainder was Zone 2.

The use of these fan-shaped zones posed a fundamental problem which became apparent when Air Force past accidents were plotted. The occurrence of accidents simply did not fall neatly within the zones. The approach-departure zones excluded some accident intensive areas while they included some areas with little or no risk.

In mid 1973, the Air Force performed an Air Force wide accident hazard study. Its purpose was to identify land areas near airports with significant aircraft accident potential. The study covered the period 1968 through 1972 and involved the review of reports on 369 major accidents that occurred within a ten (10) nautical mile radius of airfields and were directly related to airfield associated in-flight mishaps.

The analysis revealed the following basic findings:

1. Accident potential increases significantly near the extended runway centerline.

2. Seventy-five percent of the accidents plotted were near the extended runway centerline.

3. Fighter and training type aircraft account for over eighty percent of all major U.S. Air Force accidents.

4. Of the 369 accidents plotted, 84 (22.8%) occurred on or adjacent to the runway (an area 2000 feet wide from threshold to threshold).

5. Nearly sixty-one percent of the accidents occurred during the landing phase as compared to thirty-nine percent for the take-off phase.

6. Almost seventy percent of the accidents occurred during daylight hours.

7. Seventy-five percent of the accidents resulted in definable debris impact areas. The impact areas varied in size for each type of aircraft as well as the phase of flight during which the accident occurred. By using weighted averages for impact areas resulting from approach and departure accidents and grouping these by class of aircraft, it was determined that the average impact area per accident was 5.06 acres. Figures varied from 2.73 acres for trainer and miscellaneous aircraft to 8.73 acres for the heavy bombers of the transport/tanker/bomber class.

ACCIDENT POTENTIAL ANALYSIS

As previously stated, the purpose of the Air Force wide study was to define accident potential zones based on the locations of past accidents. The methodology employed the plotting of accidents for all aircraft by four classes: (1) fighter; (2) trainer/miscellaneous; (3) tanker/transport; and (4) bomber. These classes were selected because of aircraft size, speed, operational characteristics and procedures.

Because accidents cluster somewhat along the extended runway centerline, a tabulation was prepared to describe the cumulative frequency of accidents as a function of distance from the runway threshold along the extended runway centerline for widths of 2000, 3000 and 4000 feet.

The objective was to identify significant patterns of accident occurrence related to area. In other words, the result must show the maximum percentage concentration of accidents in the smallest area. Figure C-1 depicts the cumulative percentage

of accidents for all four aircraft types as a function of length and width of the area along the extended runway centerline. This indicates that the optimum width to include the maximum percentage of accidents in the smallest area is 3000 feet. Looking at distance from the threshold, curves rise very rapidly the first 3000 feet, round out more gradually from 3000 to 8000 feet and then rise more gradually from 8000 to 15,000 feet where they level off with very little slope. In other words, a zone extending beyond 15,000 feet does not include significant additional accidents and the curves below this point appear to be well represented by three zones.

Optimum zones were then determined by minimizing the area necessary to include significant percentages of accidents. Zone lengths of 3000, 8000 and 15,000 feet were used because they correspond to the break points of the curves in Figure C-1. These zones and their respective accident percentages are shown in Figure C-2.

Separate analyses were conducted to determine the validity of the zones for each of the four classes of aircraft. A chi-square analysis indicated that accident occurrence variation from one zone to another was within the acceptable range with the exception of fighter and trainer aircraft in the 3000' x 3000' Clear Zone which should be only 2000 feet wide for these aircraft.

BASIC LAND USE COMPATIBILITY

There are two primary considerations in defining statistically valid zones: (1) the relationship of accident occurrence to land area and; (2) the relationship of a single crash to the area impacted.

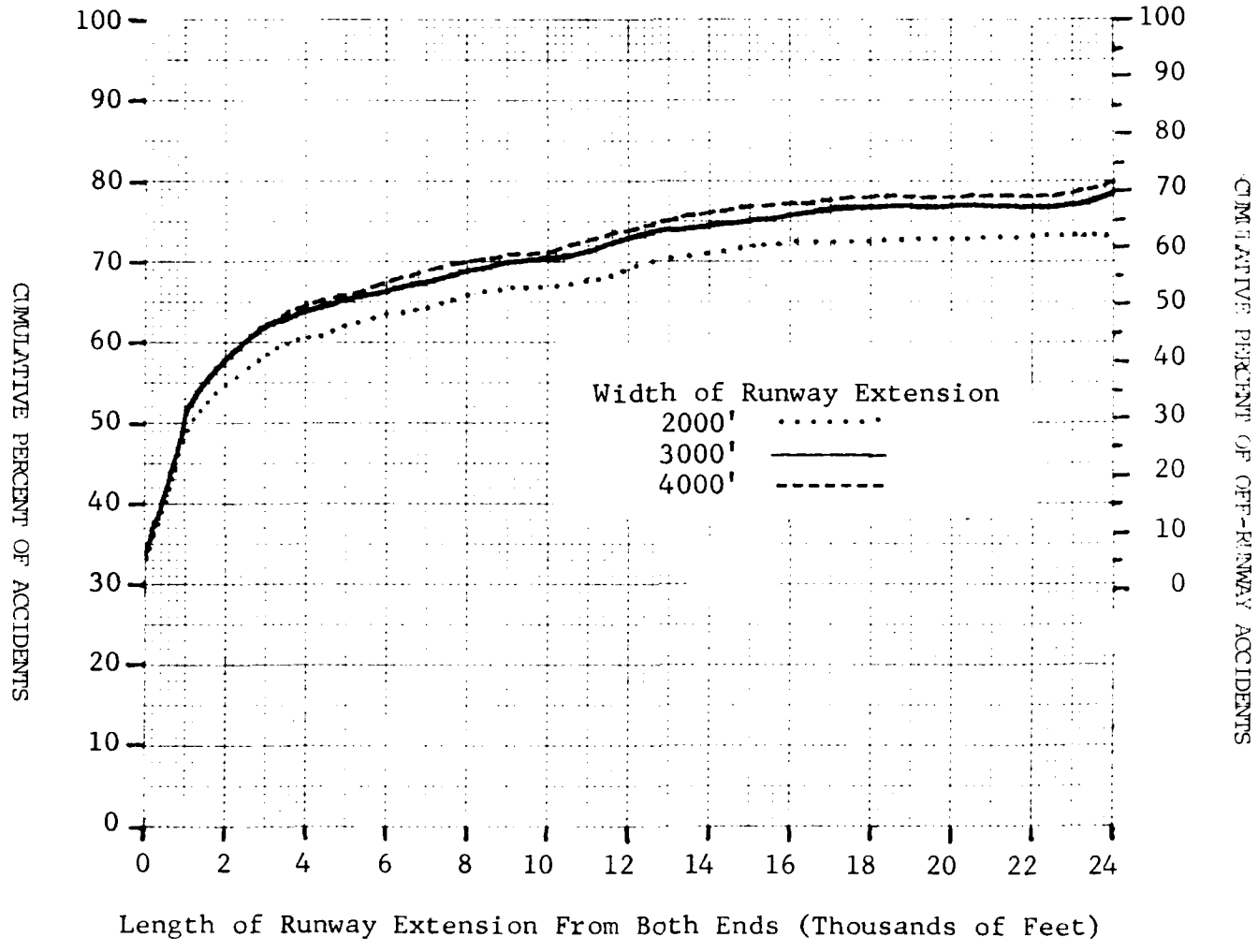
At the outset of the above referenced analysis, it was determined that the difficulties associated with producing statistically valid probabilities preclude their use. The variables are so numerous and difficult to apply to a given installation that almost any result would be subject to much discussion and controversy. However, this does not preclude the development of planning criteria based upon the employment of descriptive statistics.

Therefore, it was decided to express accident occurrence in terms of relationships between impact points and the areas of the accident zones. Figure C-3 describes these relationships. Because the objective is to produce a relative index by which land use decisions can be made, a simple procedure is paramount. The result is accident occurrence versus area scale. It is first necessary to record basic area and accident data (columns 1-5). Then the ratio of percent of total accidents to percent of total area is computed (column 6).

In each case the ratio of percent total accidents to percent total area is highest for the Clear Zone. Thus, a Hazard Index (HI) of 100 is assigned to the Clear Zone. Using column 6 for the Clear Zone as the base, the Hazard Index can then be expressed as the ratio of column 6 for each area to that of the Clear Zone. There exists an established land use standard for areas adjacent to runways - that of no buildings, structures or habitation except those to directly support flying operations. Therefore, the range between this HI and 100 determines the area for this standard.

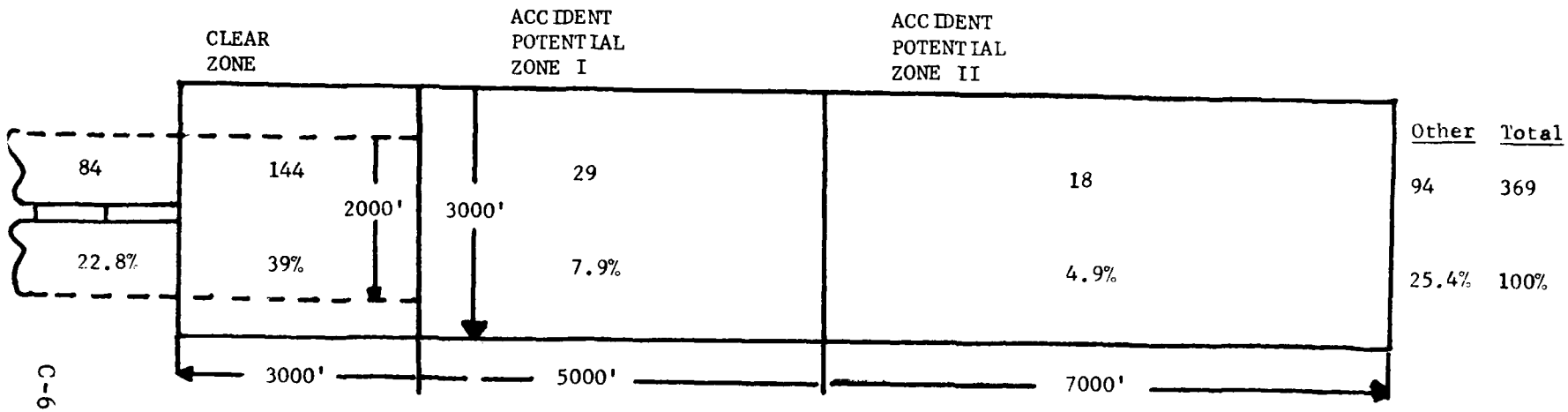
Using Figure C-3 as an example, the Clear Zone is described by HI of 100 (column 7). The HI for the area adjacent to the runway is 50 (138/278). The HIs for zones 1 and 2 are 12 and 5 respectively.

The HIs drop appreciably for zones 2 and 3. The HI for the remaining area within the airport environs is inconsequential. It is, therefore, impractical to suggest any land use control on the basis of accident hazard outside these three zones.



DISTRIBUTION OF AIR FORCE AIRCRAFT ACCIDENTS WITHIN 10 NM OF A BASE

Figure C-1



AIR FORCE ACCIDENT DATA

Figure C-2

HAZARD ANALYSIS USING AIR FORCE DATA (SEE FIGURE C-2)

	1/ AREA* (ACRES)	2/ NUMBER OF ACCIDENTS	3/ ACCIDENTS PER ACRE	4/ PERCENT TOTAL AREA	5/ PERCENT TOTAL ACCIDENTS	6/ RATIO OF % ACCIDENTS TO % AREA	7/ HAZARD INDEX**
RUNWAY	487	84	1 Per 5.8 AC	.165	22.8	138	50
CLEAR ZONE	413.5	144	1 Per 2.87 AC	.140	39	278	100
APZ I	688.5	29	1 Per 23.7 AC	.233	7.9	34	12
APZ II	964.2	18	1 Per 53.6 AC	.327	4.9	15	5
OTHER	292,483	94	1 Per 3111 AC	99.135	25.4	0.26	0.09
TOTAL	295,036.2	369	N/A	100.0	100.0	N/A	N/A

* Area includes land within 10 nautical miles of runway

** Hazard Index is calculated by (1) dividing each figure in Column 6 by ratio of % accidents/ % area for Clear Zone and (2) multiplying that number by 100.

Figure C-3

APPENDIX D

DESCRIPTION OF THE NOISE ENVIRONMENT

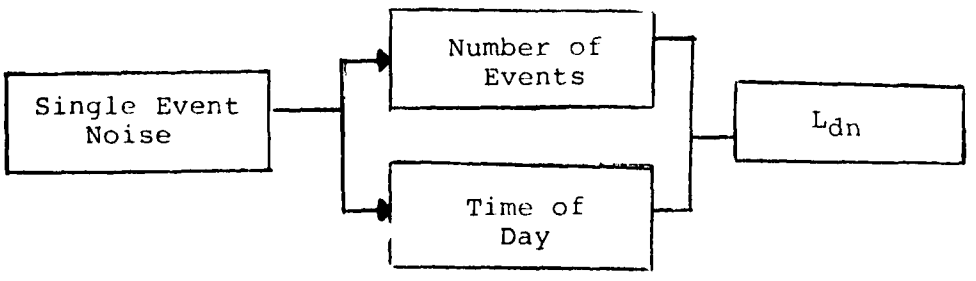
NOISE CONTOURS

In a study of airport and aircraft noise, two different types of noise measures are needed - one to measure the noise of individual noise events such as the noise of an individual aircraft flyover, and another to describe the noise environment resulting from a complex of noise events, such as the total noise effect of aircraft operations at an air base.

NOISE ENVIRONMENT DESCRIPTOR

The methodology used to produce the noise contours contained in this study consists of the Day-Night Average Sound Level (DNL) system to depict the noise environment. This method of assessing the noise impact of aircraft operations on the area surrounding airports replaces the Noise Exposure Forecast (NEF) used on an interim basis by the Air Force which replaced the Composite Noise Rating (CNR) system published by the Air Force in 1964. The Environmental Protection Agency has accepted DNL as the national uniform standard. DNL is symbolized mathematically as L_{dn}. The L_{dn} values used for planning purposes and for which contours are shown in the body of this report are 65, 70, 75, and 80. Land use guidelines are based on the compatibility of various land uses with these noise exposure levels. For broad planning purposes NEF 30, L_{dn} 65 and CNR 100 may be considered equivalent, as may NEF 40, L_{dn} 75, and CNR 115. However, due to technical differences in the three systems, direct comparison or conversion from one system to another can be misleading and is not recommended.

It is generally recognized that a noise environment descriptor should consider, in addition to the annoyance of a single event, the effect of repetition of such events and the time of day in which these events occur. As is typical of the various systems in use throughout the world today, DNL begins with a single event descriptor and adds corrections for the number of events and the time of day. Since the primary development concern is residential, night time events are considered more annoying than daytime events and are weighted accordingly. L_{dn} values are computed from the single event noise descriptor plus corrections for number of flights and time of day.

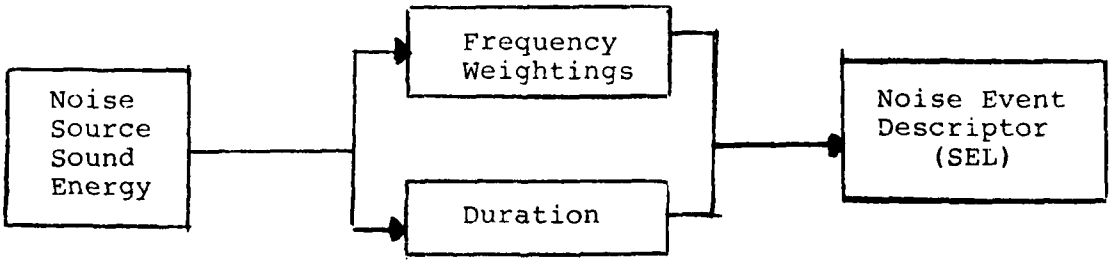


As part of an extensive data collection process, detailed information is gathered on the flight tracks flown by each type of aircraft assigned to the base and the number and time of day of flights on each of these tracks during a "typical" day. This information is used in conjunction with the single event noise descriptor to produce L_{dn} values. These values are combined on an energy summation basis to provide single L_{dn} values for the mix of aircraft operations at the base. Equal value points are connected to form the contour lines.

In contrast to the more familiar system of CNR noise assessment the DNL system's accuracy is increased since the resulting noise controus are based on incremental numbers of aircraft on each flight track rather than the step function correction factors used by CNR.

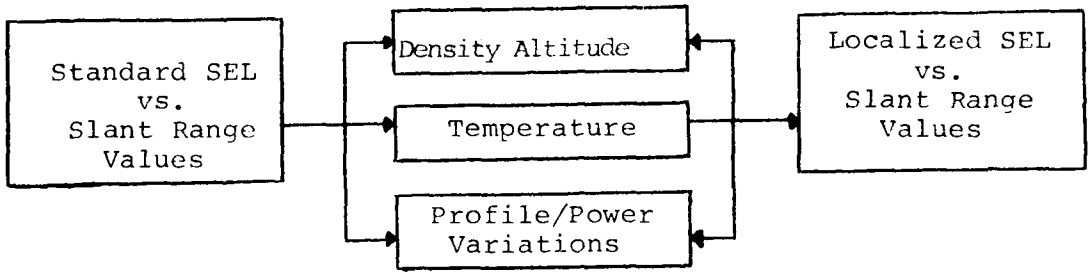
NOISE EVENT DESCRIPTOR

The single event noise descriptor used in the DNL system is the Sound Exposure Level (SEL). The SEL measure is a single value resulting from an analysis of the peak sound energy with considerations for the duration of the sound within these bands and a frequency weighting. Frequency, magnitude, and duration vary according to aircraft type, engine type, and power setting. Therefore, individual aircraft noise data are collected for various types of aircraft/engines at different power settings and phases of flight. The following diagram shows the relationship of the single event noise descriptor (SEL) to the source sound engery.



SEL versus slant range values are derived from noise measurements made according to a source noise data acquisition plan developed by Bolt, Beranek and Newman, Inc. in conjunction with

the Air Force Aerospace Medical Research Laboratory (AMRL) and carried out by AMRL. These standard day, sea level values form the basis for the individual event noise descriptors at any location and are adjusted to the location by applying appropriate corrections for temperature, density altitude and variations from standard profiles and power settings.



Ground-to-ground sound propagation characteristics are used for altitudes up to 500 feet absolute with a linear transition between 500 and 700 feet and air-to-ground propagation characteristics above 700 feet.

In addition to the assessment of aircraft flight operations, the DNL system also incorporates aircraft and engine ground runup noise resulting from engine/aircraft maintenance checks.

Data concerning the orientation of the noise source, type of aircraft or engine, number of test runs on a "typical" day, the power settings used and their duration, and use of suppression devices are collected for each ground runup or test position. This information is processed and the noise contribution added (on an energy summation basis) to the noise generated by flying operations to produce L_{dn} contours reflecting the overall noise environment with respect to aircraft air and ground operations.

NOISE CONTOUR PRODUCTION

Data describing flight tracks, flight profiles, power settings, flight path and profile utilization, and ground runup information by type aircraft/engine is assembled by the individual Air Force base. These data are screened by the major command, Headquarters Air Force, and trained personnel processing the data for input into a central computer. Flight track and utilization data are loaded into the computer and flight track check plots are generated for verification by the base and major command. After verification and incorporation of any required changes, DNL contours are generated by the computer using the base-supplied operational data, and the standard source noise data corrected to local conditions. The computer system plots these contours

which are then reviewed and prepared for photographic reproduction by specialists. A set of such contours is provided in the body of this report.

Additional technical information on the DNL procedure is available in the following publications:

1. Community Noise Exposure Resulting from Aircraft Operations: Application Guide for Predictive Procedure, AMRL-TR-73-105, November 1974 from National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151.

2. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with Adequate Margin of Safety, EPA Report 550/9-74-004, March 1974, from Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

APPENDIX E

HEIGHT AND OBSTRUCTIONS CRITERIA

GENERAL

This appendix establishes criteria for determining whether an object or structure is an obstruction to air navigation. Obstructions to air navigation are considered to be:

1. Natural objects or man-made structures that protrude above the planes or surfaces as defined in the following paragraphs and/or:

2. Man-made objects that extend more than 500 feet above the ground at the site of the structure.

EXPLANATION OF TERMS

1. Controlling Elevation. Where surfaces of planes within these criteria overlap, the governing elevation is that of the lowest surface or plane.

2. Runway Length. Mather Air Force Base has two parallel runways. The primary runway is 11,300 feet long and the secondary runway is 6,100 feet long. Both are designed and built for sustained aircraft landings and take-offs.

3. Established Airfield Elevation. The elevation, in feet above mean sea level is 96 feet for Mather Air Force Base.

4. Dimensions. All dimensions are measured horizontally unless otherwise noted.

5. Primary Surface. This surface defines the limits of obstruction clearance requirements in the immediate vicinity of the landing area. The primary surface comprises surfaces of the runways, runway shoulders, and lateral safety zones. The primary surface extends 200 feet beyond the ends of the runways, and the width of the primary surface is 2,000 feet (long runway) or 1,000 feet (short runway) on each side of the runway centerline.

6. Clear Zone Surface. This surface defines the limits of the obstruction clearance requirements in the vicinity contiguous to the end of the primary surfaces. The length of the Clear Zone surface is 3,000 feet for each runway. The width of the Clear Zone for the primary runway is 3,000 feet and for the secondary runway 2,000 feet.

7. Approach-Departure Clearance Surface. The surface is symmetrical about the runway centerlines extended, and begins as an inclined plane (glide angle) 200 feet beyond each end of the primary surfaces at the centerline elevation of the runway ends, and extends for 40,000 feet. The slope of the approach-departure clearance surface is 50:1 along the runway centerlines extended until it reaches an elevation of 500 feet above the established

airport elevation. The width of the surface at each runway end is 2,000 feet; it flares uniformly to a maximum width of 16,000 feet at a distance of 50,000 feet from the ends of the runways.

8. Inner Horizontal Surface. This surface is a plane, oval in shape at a height of 150 feet above the established airfield of 7,500 feet about the centerlines at the ends of the runways and interconnecting these arcs with tangents.

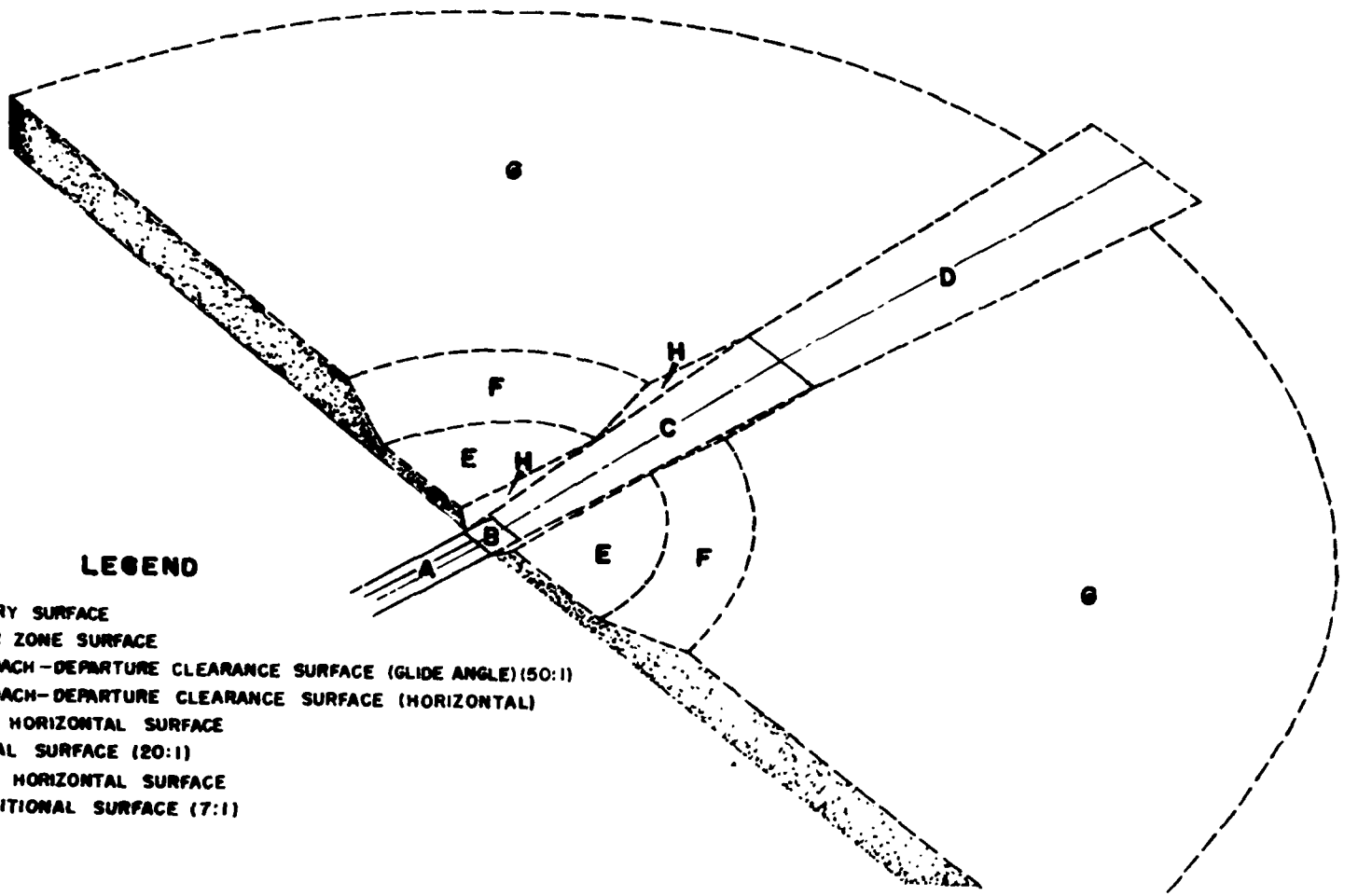
9. Conical Surface. This is an inclined surface extending outward and upward from the outer periphery of the inner horizontal surface for a horizontal distance of 7,000 feet to a height of 500 feet above the established airfield elevation. The slope at the conical surface is 20:1.

10. Outer Horizontal Surface. This surface is a plane located 500 feet above the established airfield elevation. It extends for a horizontal distance of 30,000 feet from the outer periphery of the conical surface.

11. Transitional Surfaces. These surfaces connect the primary surfaces, Clear Zone surfaces, and approach-departure surfaces to the inner horizontal surfaces, conical surface, outer horizontal surface or other transitional surfaces. The slope of the transitional surface is 7:1 outward and upward at right angles to the runway centerline. To determine the elevation for the beginning boundary of the primary surface slope at any point along the lateral boundary of the primary surface, including the Clear Zone, draw a line from this point to the runway centerline. This line will be at right angles to the runway axis. The elevation at the runway centerline is the elevation for the beginning of the 7:1 slope.

Mather Air Force Base is considered to be in a high density air traffic area. It is located within 10 miles of McClellan Air Force Base and Sacramento Executive Airport, both of which have control towers. Federal Aviation Administration (FAA) regulation establish that an airport traffic area exists five statute miles from the center of the airport up to, but not including, 3,000 feet above the aerodrome. Consequently, some overlapping of traffic areas does exist. Another factor unique to Mather Air Force Base is that its runways are situated at almost a 90 degree angle in relationship to both McClellan Air Force Base and Sacramento Executive Airport. This poses traffic conflicts under certain wind conditions. McClellan and Executive traffic will be landing toward the north and Mather traffic will be departing toward the southwest, into the flow of landing traffic.

Within a 50 mile radius of Mather Air Force Base, there are four other military airfields and three civilian airfields that have FAA control towers. Additionally, there are approximately 14 major private airfields and 62 small private airfields that are noncontrolled within this 50 mile radius. Although the locations of these fields do not directly affect Mather Air Force Base, they generate a large amount of air traffic in the Sacramento area. Because of this traffic, departure and arrival procedures at Mather Air Force Base are significantly affected.

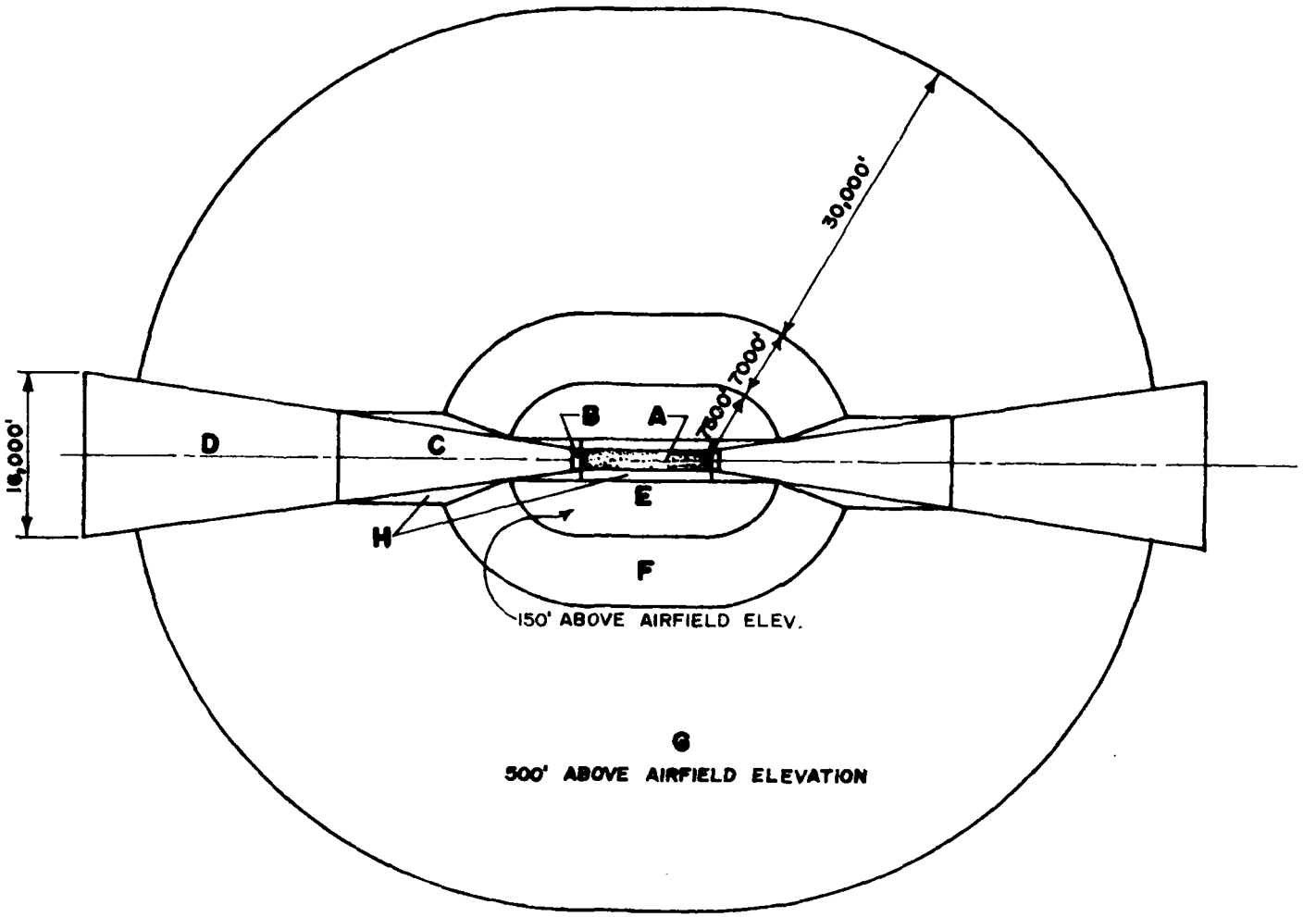


LEGEND

- **A** PRIMARY SURFACE
- **B** CLEAR ZONE SURFACE
- **C** APPROACH–DEPARTURE CLEARANCE SURFACE (GLIDE ANGLE)(50:1)
- **D** APPROACH–DEPARTURE CLEARANCE SURFACE (HORIZONTAL)
- **E** INNER HORIZONTAL SURFACE
- **F** CONICAL SURFACE (20:1)
- **G** OUTER HORIZONTAL SURFACE
- **H** TRANSITIONAL SURFACE (7:1)

AIRSPACE CONTROL SURFACES — ISOMETRIC VIEW

Figure E-1



AIRSPACE CONTROL SURFACES – PLAN

Figure E-1

APPENDIX F

NOISE LEVEL REDUCTION GUIDELINES

BACKGROUND

Environmental noise affects substantial amounts of land area within the United States. Research indicates that exterior noise may be attenuated in living and working environments through design and construction techniques (noise insulation), or by electively decreasing sounds entering occupied structures. The noise reduction required is based upon calculations of noise exposure, noise level, duration, frequency of occurrence, and time of day of the occurrence (see Appendix D, Description of the Noise Environment). The graduated Noise Level Reduction standards (NLR) are based upon the reduction in decibels (A-weighted) of a standard noise source from the exterior to the interior of a structure.

PURPOSE

This appendix provides recommended standards for design and construction techniques for primarily residential construction which will achieve the NLR corresponding to the land use compatibility guidelines identified in Section IV. These standards are intended to servce as a framework to develop, amend, or supplement a building code for exterior noise isolation with respect to aircraft noise. They are not intended to repeal, abrogate, annul, or in any way impair or interfere with existing provisions of other laws or ordinances, or with private restrictions placed upon property by convenant, deed, easement, or other private agreement. In those instances where these standards would impose a greater restriction upon the land, buildings, or structures, it is recommended that they govern. Other methods exist to achieve the NLRs.

DEFINITIONS

Words or phrases not defined in this appendix shall derive their meaning from nationally approved agencies, publications, common usage, or court cases.

A-WEIGHTED SOUND LEVELS. See Sound Level

ADJUSTED NOISE LEVEL REDUCTION (ANLR). (See Noise Level Reduction)

Noise level reduction outside-to-inside a designated room that has been adjusted as if the room, when furnished, contained an amount of sound absorption equal to the floor area of the room.[1] The adjustment is accomplished by adding to a measured sound level reduction 10 times the common logarithm of the ratio of the floor area of the room to the measured sound absorption of the room. No adjustment is added if the sound level reduction measurement is made in a room that is furnished for its intended usage.

ANSI SPECIFICATIONS

Specifications by the American National Standards Institute adopted by reference herein. Such references to decibels, frequency bands, and others, as referred to in such specifications, are inclusive as definitions within the meaning of this appendix.

ASTM SPECIFICATIONS

Specifications by the American Society for Testing Materials adopted by reference herein. Such references to decibels, frequency bands, and others, as referred to in such specifications, are inclusive as definitions within the meaning of this appendix.

DECIBEL (db)

The physical unit commonly used to describe noise levels; the unit of level such as the sound pressure level. One decibel is the level of the squared sound pressure that is $10^{1/10} = 1.259$ times the squared reference sound pressure; also, one decibel is the level of the sound pressure that is $10^{1/20} = 1.122$ times the reference pressure.

ENFORCING OFFICER

The person designated by properly constituted authority to enforce the regulation.

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[1] In many living rooms the sound absorption therein is equal to the floor area, or 10 to 20 percent more, so the adjusted noise level reduction measured in an unfurnished room is expected to be nearly equal to the sound level reduction that will exist when the room is normally furnished.

FREQUENCY

Number of complete oscillation cycles per unit of time. The unit of frequency often used is the Hertz (Hz).

FREQUENCY BAND

Difference in Hertz between the upper and lower frequencies that delimit a band, or the interval in octaves between the two frequencies. The band is located frequency-wise by the geometric mean frequency between the two band-edge frequencies. Examples are: "an octave band centered at 500 Hz, "or more simply, "the 500 Hz octave band."

HERTZ

Unit of frequency equal to one cycle per second.

DAY-NIGHT AVERAGE SOUND LEVEL (DNL, and symbolized mathematically as L_{dn}, e.g. L_{dn} 65, L_{dn} 70, etc.)

The A-weighted average sound level in decibels (re: 20 micropascals during a 24-hour period, or specified multiple thereof such as a year, with a 10-decibel weighting applied to nighttime sound levels (2200-0700)).

NOISE EXPOSURE FORECAST (NEF):

A calculated measure of noise exposure around airports based upon consideration of the noise level and duration of noise events produced by aircraft (as measured in terms of the effective perceived noise level), the number of such events per day and the time of day (day or night), during which the events occurred. The NEF value is used to determine thr relative impact of aircraft noise on land uses and human activities near airports.

NOISE LEVEL

Same as sound level, for airborne sound, unless specified otherwise.

NOISE LEVEL REDUCTION (NLR)

Difference in decibels, between the noise level outside a building and the noise level inside a designated room in the building, that was caused by exterior noise.

NOISE REDUCTION (NR)

Reduction in decibels of the sound pressure levels between two designated locations or rooms, for a stated frequency or frequency band.

NOISE ZONE

Any area of land or water which is between two noise contour lines as designated by the DNL noise descriptor system.

OCCUPIED ROOMS

Rooms within enclosed structures which are, or may reasonably be expected, to be used for human activities which involve speech communication, sleeping, eating, listening to live, recorded, or broadcast music or speech, or regular usage of telephones.

PERSON

Individual, firm, partnership, corporation, company, association, joint stock association, or body politic; includes the trustee, receiver, assignee, administrator, executor, guardian, or other representatives.

QUALIFIED ACOUSTICAL CONSULTANT

A person who, by reason of his training and experience in the science and technology of acoustics and his knowledge of construction methods and materials, is considered qualified to pass judgment on acoustical design, materials, and methods of construction for the attenuation of noise, and who is acceptable to the Enforcing Officer.

REVERBERATION TIME

Time that would be required for sound pressure level in a room to decay 60 decibels, after a sound source in the room is stopped.

SOUND ABSORPTION

Capacity of materials and furnishings in a room to absorb sound. For the purposes of this appendix, the sound absorption is equal to 0.05 times the room volume in cubic feet divided by the measured reverberation time in seconds determined with an octave band of noise centered at 500 Hertz.[1]

[1] In many normally furnished rooms, the sound absorption is roughly equal, numerically, to the floor area of the room. Sound absorption measured in a room either empty or furnished, can be obtained from measurements of the reverberation time and the volume of the room.

SOUND LEVEL

In decibels, the quantity measured by an instrument satisfying requirements of American National Standard Specification for Sound Level Meters S1.4.-1971, or the latest revision thereof. Unless explicitly described otherwise, the sound level shall be the frequency-weighted sound pressure level obtained with the frequency weighting A and the standardized dynamic characteristic SLOW.[1]

SOUND PRESSURE LEVEL

In decibels, 20 times the logarithm to base 10 of the ratio of a sound pressure to the reference sound pressure. The reference pressure for airborne sound is 20 micronewtons per square meter (0.0002 microbar).

SOUND TRANSMISSION CLASS (STC)

A single-figure rating of the sound insulating properties of a partition as determined by methods described in "Determination of Sound Transmission Class," American Society of Testing and Materials Designation E413-73.

SOUND TRANSMISSION LOSS

The noise reduction between two rooms, in a specified frequency band, plus 10 times the common logarithm of the ratio of the area of the partition to the total sound absorption in the receiving room, as determined by methods described in "Measurement of Airborne Sound Insulation in Building," American Society of Testing and Materials Designation #90-70 or latest revision thereof.[2]

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[1] In this appendix the sound level is to be understood to be the A-weighted sound level (meter response-slow). With the A-weighting, the sound-level meter is relatively less sensitive to low-frequency sound, somewhat in the way the ear is progressively less sensitive to sounds of frequency below 1000 Hertz (cycles per second).

[2] A measure of the sound insulating properties of a wall/floor/ceiling/window/door, that are characteristics of the partition itself and not the room of which it is a part.

DELINEATION OF DISTRICTS

It is recommended that the Compatible Use Districts (CUD) defined and delineated in Chapter IV be utilized for determining the required NLR.

ADOPTED SPECIFICATIONS

It is recommended that the following specifications be adopted and made a part of any ordinance: Sound level measuring instrument: ANSI S1.4-1971; Sound transmission class: ASTM E413-70T or ASTM E413-73; Sound transmission loss: ASTM E90-66T or ASTM E90-70; Air Filtration test: ASTM E283-65T or latest revision thereof.

NLR DESIGN REQUIREMENTS

General Requirements.

a. The recommended NLR requirements for Chapter IV CUDs may be achieved by any suitable combination of building design, choice of building materials and execution of construction details in accordance with established architectural and acoustical principles. The NLR requirements should apply to all occupied rooms having one or more exterior walls or ceilings, when furnished in accordance with the intended final usage of the rooms.

b. Compliance with the recommended design and construction standards of this appendix satisfies the NLR requirements recommended in the CUDs of Chapter IV. The standards should be applied to plans and specifications for any proposed structure or use for which an NLR 25, NLR 30, or NLR 35 is recommended. If the plans or specifications do not indicate compliance with the recommended standards of this appendix, a written statement from a qualified acoustical consultant should accompany the plans and specifications certifying that the construction of the building will result in an NLR for appropriate occupied rooms at least as great as the NLR value specified for the applicable CUD. Additions, alterations, repairs, and changes of use or occupancy in existing buildings should comply with the provisions of this appendix except as recommended in the Uniform Building Code.

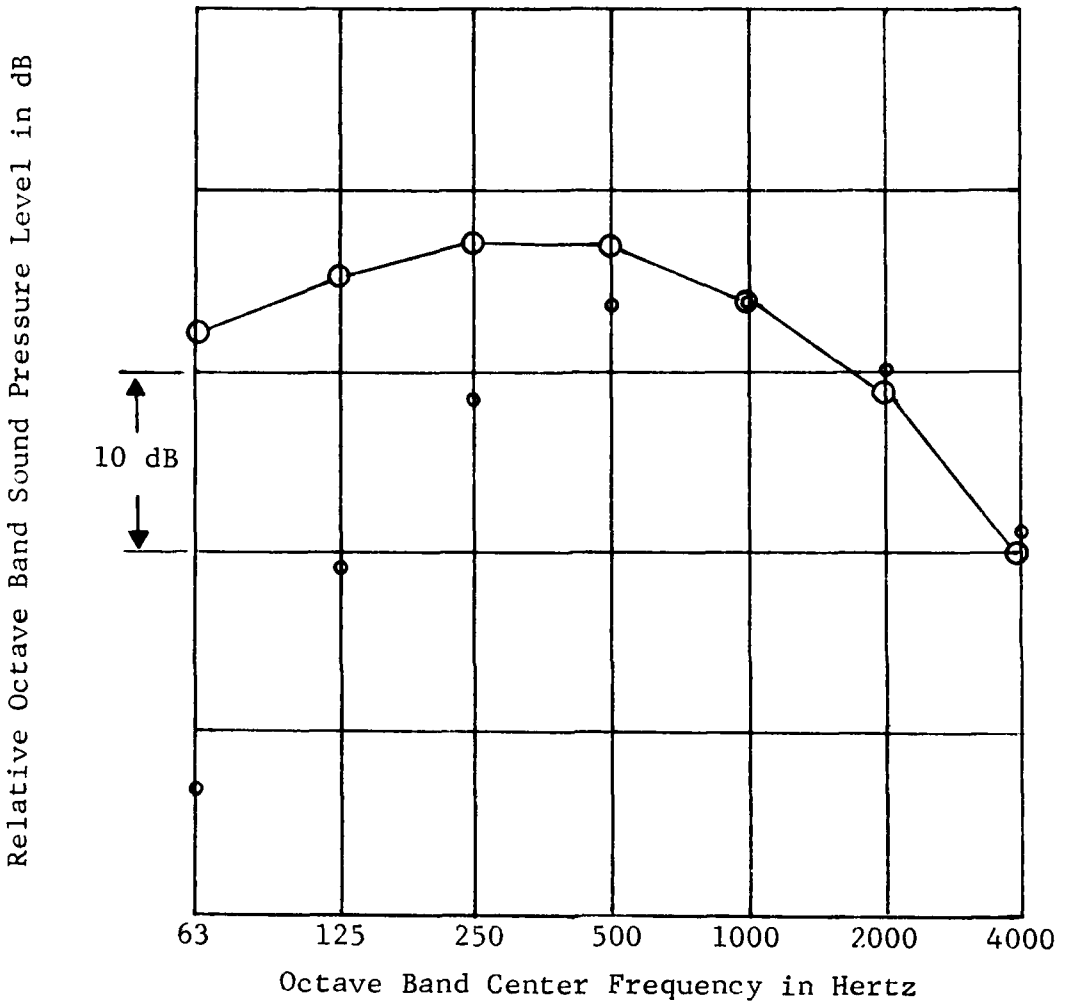
NLR DESIGN INFORMATION

For calculations undertaken for purposes of meeting the recommendations of this appendix, a Qualified Acoustical

Consultant may use the assumed outside noise spectrum shown in figure F-1. Such calculations should take into account the area of exposed room surfaces, the sound transmission loss characteristics of exposed room surfaces, and the amount of sound absorption in the room. For rooms in residential structures the ratio of the sound absorption in each room to the room floor area may be assumed to be:

OCTAVE CENTER FREQUENCY BAND, H_3	SOUND ABSORPTION FLOOR AREA
63	0.30
125	0.50
250	0.75
500 and higher	1.0

Allowances should be made for a decrement of at least two decibels for sound leaks and flanking sound transmission paths.



Note: Closed Circles show the corresponding relative A-Weighted octave band sound pressure levels.

FIGURE F-1

OCTAVE BAND NOISE SPECTRUM TO BE USED FOR CALCULATION OF NOISE LEVEL REDUCTION

RECOMMENDED BUILDING REQUIREMENTS

A. SECTION 1 - RECOMMENDED BUILDING REQUIREMENTS FOR A MINIMUM NOISE LEVEL REDUCTION OF 25 db

1-1 Compliance

Compliance with the following standards shall be deemed to meet the requirements of the compatible use districts in which an NLR 25 is specified.

1-2 General

a. Brick veneer, masonry blocks, or stucco exterior walls shall be constructed airtight. All joints shall be grouted or caulked airtight.

b. At the penetration of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked or filled with mortar.

c. Window and/or through-the-wall ventilation units shall not be used.

d. Through-the-wall/door mail boxes shall not be used.

1-3 Exterior Walls

a. Exterior walls other than as described in this section shall have a laboratory sound transmission class rating of at least STC-39.

b. Masonry walls having a surface weight of at least 25 pounds per square foot do not require a furred (stud) interior wall. At least one surface of concrete block walls shall be plastered or painted with heavy "bridging" paint.

c. Stud walls shall be at least 4" in nominal depth and shall be finished on the outside with siding-on-sheathing, stucco, or brick veneer.

(1) Interior surface of the exterior walls shall be of gypsum board or plaster at least 1/2" thick, installed on the studs.

(2) Continuous composition board, plywood or gypsum board sheathing at least 1/2" thick shall cover

the exterior side of the wall studs behind wood, or metal siding. Asphaltic or wood shake shingles are acceptable in lieu of siding.

(3) Sheathing panels shall be butted tightly and covered on the exterior with overlapping building paper. The top and bottom edges of the sheathing shall be sealed.

(4) Insulation material at least 2" thick shall be installed continuously throughout the cavity space behind the exterior sheathing and between wall studs. Insulation shall be glass fiber or mineral wool.

1-4 Windows

a. Windows other than as described in this section shall have a laboratory sound transmission class rating of at least STC-28.

b. Glass shall be at least 3/16" thick.

c. All operable windows shall be weather stripped and airtight when closed so as to conform to an air infiltration test not to exceed 0.5 cubic foot per minute per foot of crack length in accordance with ASTM E-283-65-T.

d. Glass of fixed-sash windows shall be sealed in an airtight manner with a nonhardening sealant, or a soft elastomer gasket or glazing tape.

e. The perimeter of window frames shall be sealed airtight to the exterior wall construction with a sealant conforming to one of the following Federal specifications: TT-S-00227, TT-S-00230, or TT-S-00153.

f. The total area of glass in both windows and doors in sleeping spaces shall not exceed 20 percent of the floor area.

1-5 Doors

a. Doors, other than as described in this section, shall have a laboratory sound transmission class rating of at least STC-28.

b. All exterior side-hinged doors shall be solid-core wood or insulated hollow metal at least 1 3/4" thick and shall be fully weather stripped.

c. Exterior sliding doors shall be weather stripped with an efficient airtight gasket system with performance as specified in Section 1-4c. The glass in the sliding doors shall be at least 3/16" thick.

d. Glass in doors shall be sealed in an airtight nonhardening sealant, or in a soft elastomer gasket or glazing tape.

e. The perimeter of door frames shall be sealed airtight to the exterior wall construction as described in Section 1-4e.

1-6 Roofs

a. Combined roof and ceiling construction other than described in this section and Section 1-7 shall have a laboratory sound transmission class rating of at least STC-39.

b. With an attic or rafter space at least 6" deep, and with a ceiling below, the roof shall consist of closely butted 1/2" composition board, plywood or gypsum board sheathing topped by roofing as required.

c. If the underside of the roof is exposed, or if the attic or rafter spacing is less than 6", the roof construction shall have a surface weight of at least 25 pounds per square foot. Rafters, joists or other framing may not be included in the surface weight calculation.

d. Window or dome skylights shall have a laboratory sound transmission class rating of at least STC-28.

1-7 Ceilings

a. Gypsum board or plaster ceilings at least 1/2" thick shall be provided where required by paragraph 1-6b above. Ceilings shall be substantially airtight, with a minimum number of penetrations.

b. Glass fiber or mineral wool insulation at least 2" thick shall be provided above the ceiling between joists.

1-8 Floors

Openings to any crawl spaces below the floor of the lowest occupied rooms shall not exceed 2 percent of the floor area of the occupied rooms.

1-9 Ventilation

a. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior.

b. Gravity vent openings in attic shall not exceed code minimum in number and size.

c. If a fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel, which shall be lined with 1" thick coated glass fiber, and shall be at least five feet long with one 90^{o} bend.

d. All vent ducts connecting the interior space to the outdoors, excepting domestic range exhaust ducts, shall contain at least a five foot length of internal sound absorbing duct lining. Each duct shall be provided with a bend in the duct such that there is no direct line of sight through the duct from the venting cross section to the room-opening cross section.

e. Duct lining shall be coated glass fiber duct liner at least 1" thick.

f. Domestic range exhaust ducts connecting the interior space to the outdoors shall contain a baffle plate across the exterior termination which allows proper ventilation. The dimensions of the baffle plate should extend at least one diameter beyond the line of sight into the vent duct. The baffle plate shall be of the same material and thickness as the vent duct material.

g. Fireplaces shall be provided with well-fitted dampers.

B. SECTION 2 - RECOMMENDED BUILDING REQUIREMENTS FOR A MINIMUM NOISE LEVEL REDUCTION OF 30 db

2-1 Compliance

Compliance with the following standards shall be deemed to meet the requirements of the Compatible Use Districts in which an NLR 30 is specified.

2-2 General

a. Brick veneer, masonry blocks or stucco exterior walls shall be constructed airtight. All joints shall be grouted or caulked airtight.

b. At the penetration of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked or filled with mortar.

c. Window and/or through-the-wall ventilation units shall not be used.

d. Operational vented fireplaces shall not be used.

e. All sleeping spaces shall be provided with either a sound-absorbing ceiling or a carpeted floor.

f. Through-the-wall/door mailboxes shall not be used.

2-3 Exterior Walls

a. Exterior walls other than as described below shall have a laboratory sound transmission class rating of at least STC-44.

b. Masonry walls having a surface weight of at least 40 pounds per square foot do not require a furred (stud) interior wall. At least one surface of concrete block walls shall be plastered or painted with heavy "bridging" paint.

c. Stud walls shall be at least 4" in nominal depth and shall be finished on the outside with siding-on-sheathing, stucco, or brick veneer.

(1) Interior surface of the exterior walls shall be of gypsum board or plaster at least 1/2" thick, installed on the studs. The gypsum board or plaster may be fastened rigidly to the studs if the exterior is brick veneer or stucco. If the exterior is siding-on-sheathing, the

interior gypsum board or plaster must be fastened resiliently to the studs.

(2) Continuous composition board, plywood, or gypsum board sheathing shall cover the exterior side of the wall studs behind wood, or metal siding. The sheathing and facing shall weigh at least four pounds per square foot.

(3) Sheathing panels shall be butted tightly and covered on the exterior with overlapping building paper. The top and bottom edges of the sheathing shall be sealed.

(4) Insulation material at least 2" thick shall be installed continuously throughout the cavity space behind the exterior sheathing and between wall studs. Insulation shall be glass fiber or mineral wool.

2-4 Windows

a. Windows other than as described in this section shall have a laboratory sound transmission class rating of at least STC-33.

b. Glass of double-glazed windows shall be at least 1/8" thick. Panes of glass shall be separated by a minimum 3" air space.

c. Double-glazed windows shall employ fixed sash or efficiently weather stripped operable sash. The sash shall be rigid and weather stripped with material that is compressed airtight when the window is closed so as to conform to an infiltration test not to exceed 0.5 cubic foot per minute per foot of crack length in accordance with ASTM E-283-65-T.

d. Glass of fixed-sash windows shall be sealed in an airtight manner with a nonhardening sealant, or a soft elastomer gasket or glazing tape.

e. The perimeter of window frames shall be sealed airtight to the exterior wall construction with a sealant conforming to one of the following Federal specifications: TT-S-00227, TT-S-00230, or TT-S-00153.

f. The total area of glass of both windows and exterior doors in sleeping spaces shall not exceed 20 percent of the floor area.

2-5 Doors

a. Doors, other than as described in this section, shall have a laboratory sound transmission class rating of at least STC-33.

b. Double door construction is required for all door openings to the exterior. Openings fitted with side-hinged doors shall have one solid-core wood or insulated hollow metal core door at least 1 3/4" thick, separated by an airspace of at least 4" from another door, which can be a storm door. Both doors shall be tightly fitted and weather stripped.

c. The glass of double-glazed sliding doors shall be separated by a minimum 4" airspace. Each sliding frame shall be provided with an efficiently airtight weather stripping material as specified in Section 2-4c.

d. Glass of all doors shall be at least 3/16" thick. Glass of double sliding doors shall not be equal in thickness.

e. The perimeter of door frames shall be sealed airtight to the exterior wall construction as indicated in Section 8-4e.

f. Glass of doors shall be set and sealed in an airtight nonhardening sealant, or a soft elastomer gasket or glazing tape.

2-6 Roofs

a. Combined roof and ceiling construction other than described in this section and Section 2-7 shall have a laboratory sound transmission class rating of at least STC-44.

b. With an attic or rafter space at least 6" deep, and with a ceiling below, the roof shall consist of closely butted 1/2" composition board, plywood, or gypsum board sheathing topped by roofing as required.

c. If the underside of the roof is exposed, or if the attic or rafter spacing is less than 6", the roof construction shall have a surface weight of at least 40 pounds per square foot. Rafters, joists or other framing may not be included in the surface weight calculation.

d. Window or dome skylights shall have a laboratory sound transmission class rating of at least STC-33.

2-7 Ceilings

a. Gypsum board or plaster ceilings at least 1/2" thick shall be provided where required by paragraph 2-6b above. Ceilings shall be substantially airtight, with a minimum number of penetrations.

b. Glass fiber or mineral wool insulation at least 2" thick shall be provided above the ceiling between joists.

2-8 Floors

The floor of the lowest occupied rooms shall be slab on fill, below grade, or over a fully enclosed basement. All door and window openings in the fully enclosed basement shall be tightly fitted.

2-9 Ventilation

a. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior.

b. Gravity vent openings in attic shall not exceed code minimum in number and size. The openings shall be fitted with transfer ducts at least three feet in length, containing internal sound absorbing duct lining. Each duct shall have a lined 90° bend in the duct such that there is no direct line of sight from the exterior through the duct into the attic.

c. If a fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel, which

shall be lined with 1" thick coated glass fiber, and shall be at least five feet long with one 90^{o} bend.

d. All vent ducts connecting the interior space to the outdoors, excepting domestic range exhaust ducts, shall contain at least a 10 foot length of internal sound absorbing duct lining. Each duct shall be provided with a lined 90^{o} bend in the duct such that there is no direct line of sight through the duct from the venting cross section to the room opening cross section.

e. Duct lining shall be coated glass fiber duct liner at least 1" thick.

f. Domestic range exhaust ducts connecting the interior space to the outdoors shall contain a baffle plate across the exterior termination which allows proper ventilation. The dimensions of the baffle plate should extend at least one diameter beyond the line of sight into the vent duct. The baffle plate shall be of the same material and thickness as the vent duct material.

g. Building heating units with flues or combustion air vents shall be located in a closet or room closed off from the occupied space by doors.

h. Doors between occupied space and mechanical equipment areas shall be solid core wood or 20 gauge steel hollow metal at least 1 3/4" thick and shall be fully weather stripped.

C. SECTION 3 - RECOMMENDED BUILDING REQUIREMENTS FOR A MINIMUM NOISE LEVEL REDUCTION OF 35 db

3-1 Compliance

Compliance with the following standards shall be deemed to meet the requirements of the Compatible Use Districts in which an NLR 35 is specified.

3-2 General

a. Brick veneer, masonry blocks, or stucco exterior walls shall be constructed airtight. All joints shall be grouted or caulked airtight.

b. At the penetration of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked or filled with mortar.

c. Window and/or through-the-wall ventilation units shall not be used.

d. Operational vented fireplaces shall not be used.

e. All sleeping spaces shall be provided with either a sound absorbing ceiling or a carpeted floor.

f. Through-the-wall/door mailboxes shall not be used.

g. No glass or plastic skylight shall be used.

3-3 Exterior Walls

a. Exterior walls other than as described below shall have a laboratory sound transmission class rating of at least STC-49.

b. Masonry walls having a surface weight of at least 75 pounds per square foot do not require a furred (stud) interior wall. At least one surface of concrete block walls shall be plastered or painted with heavy "bridging" paint.

c. Stud walls shall be at least 4" in nominal depth and shall be finished on the outside with siding-on-sheathing, stucco, or brick veneer.

(1) Interior surface of the exterior walls shall be of gypsum board or plaster at least 1/2" thick, installed on studs. The gypsum board or plaster may be fastened rigidly to the studs if the exterior is brick veneer. If the exterior is stucco or siding-on-sheathing, the interior gypsum board or plaster must be fastened resiliently to the studs.

(2) Continuous composition board, plywood, or gypsum board sheathing shall cover the exterior side of the wall studs behind wood, or metal siding. The sheathing and facing shall weigh at least four pounds per square foot.

(3) Sheathing panels shall be butted tightly and covered on the exterior with overlapping building paper. The top and bottom edges of the sheathing shall be sealed.

(4) Insulation material at least 3 1/2" thick shall be installed continuously through the cavity space behind the exterior sheathing and between wall studs. Insulation shall be glass fiber or mineral wool.

3-4 Windows

a. Windows other than as described in this section shall have a laboratory sound transmission class rating of at least STC-38.

b. Double-glazed windows shall employ fixed sash. Glass of double-glazed windows shall be at least 1/8" thick. Panes of glass shall be separated by a minimum 3" air space and shall not be equal in thickness.

c. Glass of windows shall be sealed in an airtight manner with a nonhardening sealant, or a soft elastomer gasket or glazing tape.

d. The perimeter of window frames shall be sealed airtight to the exterior wall construction with a sealant conforming to one of the following Federal specifications: TT-S-00227, TT-S-00230, or TT-S-00153.

e. The total area of glass of both windows and exterior doors in sleeping spaces shall not exceed 20 percent of the floor area.

3-5 Doors

a. Doors, other than as described in this section, shall have a laboratory sound transmission class rating of at least STC-38.

b. Double door construction is required for all door openings to the exterior. The door shall be side-hinged and shall be solid-core wood or insulated hollow metal, at least 1 3/4" thick, separated by a vestibule at least three feet in length. Both doors shall be tightly fitted and weather stripped.

c. The perimeter of door frames shall be sealed air-tight to the exterior wall construction as specified in Section 3-4d.

3-6 Roofs

a. Combined roof and ceiling construction other than described in this section and Section 3-7 shall have a laboratory sound transmission class rating of at least STC-49.

b. With an attic or rafter space at least 6" deep, and with a ceiling below, the roof shall consist of closely butted 1/2" composition board, plywood, or gypsum board sheathing topped by roofing as required.

c. If the underside of the roof is exposed, or if the attic or rafter spacing is less than 6", the roof construction shall have a surface weight of at least 75 pounds per square foot. Rafters, joists or other framing may not be included in the surface weight calculation.

3-7 Ceilings

a. Gypsum board or plaster ceilings at least 1/2" thick shall be provided where required by paragraph 3-6. Ceilings shall be substantially airtight, with a minimum number of penetrations. The ceiling panels shall be mounted on resilient clips or channels. A nonhardening sealant shall be used to seal gaps between the ceiling and walls around the ceiling perimeter.

b. Glass fiber or mineral wool insulation at least 3 1/2" thick shall be provided above the ceiling between joists.

3-8 Floors

The floors of the lowest occupied rooms shall be slab on fill or below grade.

3-9 Ventilation

a. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied

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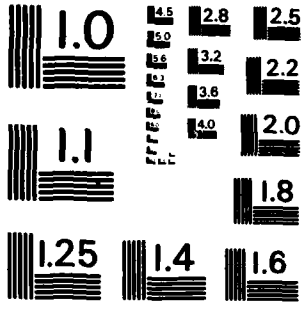

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without need to open any windows, doors, or other openings to the exterior.

b. Gravity vent openings in attic shall not exceed code minimum in number and size. The openings shall be fitted with transfer ducts at least six feet in length containing internal sound absorbing duct lining. Each duct shall have a lined 90° bend in the duct such that there is no direct line of sight from the exterior through the duct into the attic.

c. If a fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel, which shall be lined with 1" thick coated glass fiber, and shall be at least 10 feet long with one 90° bend.

d. All vent ducts connecting the interior space to the outdoors excepting domestic range exhaust ducts, shall contain at least a 10 foot length of internal sound absorbing duct lining. Each duct shall be provided with a lined 90° bend in the duct such that there is no direct line of sight through the duct from the venting cross section to the room-opening cross section.

e. Duct lining shall be coated glass fiber duct liner at least 1" thick.

f. Domestic range exhaust ducts connecting the interior space to the outdoors shall contain a baffle plate across the exterior termination which allows proper ventilation. The dimensions of the baffle plate should extend at least one diameter beyond the line of sight into the vent duct. The baffle plate shall be of the same material and thickness as the vent duct material.

g. Building heating units with flues or combustion air vents shall be located in a closet or room closed off from the occupied space by doors.

h. Doors between occupied space and mechanical equipment areas shall be solid core wood or 20 gauge steel hollow metal at least 1 3/4" thick and shall be fully weather stripped.

RECOMMENDED ADMINISTRATION AND ENFORCEMENT

General

It is recommended that an Enforcing Officer administer and enforce these recommendations if adopted as an ordinance. Application for permits and variances should be made to the Enforcing Officer.

Verification of Building Noise Level Reduction

It is recommended that the Enforcing Officer, prior to granting final approval of the finished building construction, require at the expense of the owner, field tests by a Qualified Acoustical Consultant to verify the noise level reduction (NLR) of the building whenever it appears that variations from sound-isolation features in the approved plan, poor sealing methods, or defective workmanship may have been employed. The report of verification should be filed with the Enforcing Officer and include a description of the verification method, measurement instrumentation, and the results of the noise level reduction-measurements.

The noise level reduction requirements of Chapter IV should be satisfied for each occupied room. For the purposes of verification, it would suffice to test only in those occupied rooms in which exterior noise is most likely to penetrate.

Verification Test Procedure

For the purpose of verifying compliance with the noise level reduction requirements in a completed building, aircraft noise prevailing outside the building may be used as the sound source.

Using the noise signal generated by an individual aircraft operation (flyover event), outside and inside noise levels should be measured simultaneously. The difference between the maximum noise levels measured outside and inside the room for the flyover event should be taken as the measured NLR for the flyover event, provided that the maximum inside noise level exceeds by at least seven decibels the background noise level in the absence of the flyover.

The NLR shall be determined for at least four flyover events for each room tested. The resulting NLR value assigned to the room should be the arithmetic average of the individual flyover event NLR values.

For occupied rooms in residential structures, the inside noise level should be measured with a single microphone four feet above the floor near the center of the room. For other than residential structures, the inside noise level should be measured with a single microphone five feet above the floor, either near the center of the room, or eight feet into the room from the center of the exterior wall most directly exposed to the aircraft noise, whichever distance from the most directly exposed wall is smaller.

The outside noise level should be measured at an unobstructed location approximately five feet above the level of the floor of the room under the test and eight feet outside the exterior wall most directly exposed to the aircraft noise source, near the center of the wall.

For structures in which several rooms are to be evaluated, the tests need be conducted only for those rooms whose exterior walls are most directly exposed to the noise source. If noise level reduction requirements are met for these rooms, the tests need not be repeated for rooms of similar construction which are not as directly exposed to the flyover event.

For structures where a number of rooms receive nearly-equal exposure to aircraft noise, tests need be conducted in only two of the near-identical rooms.

For residential units, it will usually be sufficient to conduct tests in two rooms. One of the rooms to be tested should be the bedroom most directly exposed to aircraft noise. The other room to be tested should be either the living room, dining room, or family room, whichever is most directly exposed to the aircraft noise source.

When the noise level reduction is measured in an unfurnished room or a room furnished less than normally, the adjusted noise level reduction should be computed by adding 10 times the logarithm to the base 10 of the ratio of the floor area of the room to the sound absorption in

the unfurnished room, but in any event, such correction should not exceed two decibels. The adjusted noise level reduction value should be used in determining compliance with the NLR requirements. If the noise level reduction is measured in a furnished room, no adjustment in the noise level reduction shall be made.

The noise levels measured outside and inside the room under test may be observed directly by simultaneously reading the maximum noise levels on two sound level meters. Alternatively, the outside and inside flyover event noise signals shall be recorded on magnetic tape with noise level reduction determined by analysis of the recorded signals. In either case, the two measuring systems used for outside and inside noise measurements must each satisfy the requirements for a Type 2 sound level meter according to ANSI S1.4-1971 and be operated in the manner designated by ANSI S1.13-1971 (or latest revisions thereof). Further, the two systems are to be calibrated prior to and following the flyover events so that they indicate the same sound level within one decibel for the same noise, using suitable calibration procedures as specified by the sound level meter manufacturer.

APPENDIX G

ANALYSIS OF POSSIBLE OPERATIONAL CHANGES

Introduction

Consideration and analysis of possible operational changes which might be made to reduce the noise upon the Sacramento area is a continuing process that is constantly being reviewed and updated at Mather AFB.

There are several factors that have a direct bearing on the noise generated by aircraft overflights. These are type of aircraft, type of engine, engine power setting, speed, altitude, flight path, number of operations, and the time of day. Some of the possibilities for reducing aircraft generated noise are: (1) introducing quieter engines; (2) reducing power settings; (3) increasing airspeeds; (4) increasing altitude; (5) relocating flight paths; (6) reducing the number of flights; and (7) flying less during the late and early morning hours. This analysis will address each of these areas in an effort to explain what is or what is not being done to alleviate noise problems.

Quieter Engines

In the production of new aircraft, the design and engineering of quieter and more efficient engines is a major consideration. The T-43, now operational at Mather, has noise reduction features built into its engines. However, other aircraft flying out of Mather, the T-37, KC-135, and B-52, were built prior to such jet engine technology. No change to quieter engines is forcast at Mather AFB in the near future.

Reducing Power Settings

Low power approaches are not an effective technique for jet powered aircraft due to the fact that jet engine acceleration time and power response is very slow in comparison to reciprocating engine. Airflow over aerodynamic surfaces increases immediately as a result of the propeller action on a conventional aircraft, but this lack of airflow in jet aircraft necessitates different approach techniques. The aircraft is flown in a high drag configuration which requires that the engines be at a relatively high power setting for landings. For takeoffs, normally, 100 percent of the power available is required by the T-37, B-52 and KC-135 aircraft. This is due to limited thrust in the case of the T-37, and large aircraft gross weights in the case of the B-52 and KC-135. The T-43 is capable of, and does make, reduced thrust takeoffs when temperature and runway conditions permit. This means less noise during their takeoffs.

Increasing Airspeeds

At the present time, the aircraft at Mather AFB operate at the maximum speeds allowable, consistant with the Federal Aviation Administration (FAA)

rules and aircraft performance, except when maneuvering for approach and landing. Increasing the speeds for approaches and landing produces several undesirable characteristics that make this area an impractical consideration for noise reduction. Increasing approach and landing speeds compresses the time frame the aircraft spends transitioning from enroute speeds to landing. This, in turn, increases the pilot work load during a critical phase of flight by forcing him to accomplish normal functions in less time, which may jeopardize flying safety. Flying higher final approach speeds on established glid paths increases the rate of descent to the point that it would be greater than that recommended in Air Force and FAA regulations. High rates of descent make transitioning to landing more difficult. The increased airspeed on approach also results in aircraft touching down farther down the runway and using much more runway to slow down. This becomes very critical during wet and slippery runway operations. To operate the aircraft at speeds in excess of design airspeeds would be an unsafe practice and could greatly increase the potential for an accident.

Increasing Altitudes and Relocating Flight Paths

To the extent possible, Mather has examined these areas and where feasible has taken action to reduce noise levels by increasing altitudes and relocating flight paths. At Mather, the active runways are predominately runways 22 Left and 22 Right. Traffic arrives from the northeast and departs to the southwest. Recently, some of the instrument approach procedures have been redesigned; resulting in shifting the flight path of arriving aircraft father south, away from the community of El Dorado Hills. At twelve nautical miles from the field, the minimum altitude for aircraft is now 3,000 feet. This reduces the noise level for the communities in that area. Mather now uses a three degree glide slope on its precision approaches as opposed to the old 2.75 degree glide slope. This, too, keeps the aircraft higher for a longer period of time. Radar vectoring for instrument approaches and visual flight patterns for T-43, KC-135 and B-52, and other large aircraft, is conducted to the south of Mather over sparsely populated areas. The T-37 visual flight patterns are to the north side of the base, but these are flown 1,000 feet above the ground and their turn radius is such that they remain within the geographical boundaries. All aircraft depart Mather using Standard Instrument Departures. These are procedures developed by the base to allow aircraft to depart and enter the airway structure with a minimum amount of radar vectoring, and noise abatement considerations. Presently, no departure turns toward the north over Sacramento.

Reducing the Number of Flights and Flying Less at Night

The number of flights that Air Training Command and Strategic Air Command conduct is dictated by higher headquarters. At present, Mather AFB is the sixth busiest base in the Air Force. Flight schedules, mission routes, and altitudes are predicated on optimum training per flying hour, maintenance capabilities, and, in the case of SAC aircraft, on alert and crew sorties. For these reasons, missions must be flown around the clock. However, Mather has restrictions on the number of approaches flown between 10:00 p.m. and 6:00 a.m.

Other Considerations

Mather has taken other steps to reduce the noise generated by the operation of aircraft. Both the T-37 and T-43 aircraft shut down one engine when taxiing back to park. This procedure reduces noise and conserves fuel. The ground run-up of aircraft engines has been restricted to daylight hours to reduce noise at night. Mather constantly reviews operational procedures to minimize the noise impact on the Sacramento area. As the state of the art changes, it is possible that new procedures and methods will be found to further decrease noise in the Mather AFB environs.

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